NEW OR LITTLE-KNOWN CRANE-FLIES FROM THE UNITED STATES AND CANADA: TIPULIDÆ, PTYCHOPTERIDÆ, DIPTERA. PART 3.

BY CHARLES P. ALEXANDER.

Introduction.

In this paper, the author has undertaken a review of the Nearctic species of the difficult Eriopterine genus, *Gonomyia,* and has supplied figures of the wings and hypopygia of the various species. The remainder of the paper is in the nature of a continuation of the first two papers under this title.[1] In order to complete the data in some sections of the family, especially the genus *Geranomyia,* it has been deemed advisable to add a few extra-limital species, most of these being Antillean or Middle American forms whose northward range is still not well understood.

Description of New or Little-known Species.

Family **TIPULIDÆ.**

Subfamily LIMNOBINÆ.

Tribe **Limnobini.**

GERANOMYIA Haliday.

Geranomyia Haliday; Entomologists Magazine, vol. 1, p. 154 (1833).

Geranomyia canadensis Westwood. (Plate XXV, fig. 1.)

Limnobiorhynchus canadensis Westwood; Annales Société Entomologique de France, p. 683 (1835).

A wide-ranging species in the central and eastern United States, from New Brunswick and the Hudsons Bay region, south to Georgia and Florida, west to Michigan, Illinois, Kentucky, Tennessee and Texas. Studies by Knab[2] and others show this fly to feed on nectar of Composite flowers (*Eupatorium, Solidago, Aster, Silphium, Rudbeckia, Verbesina, Cacalia,* etc.) in the late afternoon and evening. A male from Brownsville, Texas, in May (C. H. T. Townsend).

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[1] Proceedings of The Academy of Natural Sciences of Philadelphia, October, 1914, pp. 579–606.
Proceedings of The Academy of Natural Sciences of Philadelphia, September, 1915, pp. 458–514.

[2] The Feeding Habits of Geranomyia: *Proceedings of the Entomological Society of Washington,* vol. 12, pp. 61–65 (1910).

Geranomyia guatemalensis sp. n. (Extra-limital.)

Related to *canadensis* Westwood; head gray with a narrow median line; thorax yellowish brown with three indistinct stripes; femora with a brownish subterminal annulus; abdominal tergites ringed brown and yellowish.

Male.—Length, excluding the rostrum, 6.5 mm.; wing, 6.7 mm.; rostrum, 4 mm.

Female.—Length as above, 6.8 mm.; wing, 8 mm.; rostrum, 4.1 mm.

Rostrum elongate, brown, more darkened toward the apex. Antennæ rather short, black, the scape dark brown; flagellar segments rounded-oval. Head gray with a delicate, more or less distinct, median line.

Thoracic dorsum yellowish brown, the præscutum with three broad, though rather indistinct, brown stripes, the middle stripe broad behind, not attaining the suture; scutal lobes brown, median area of the scutum and the scutellum pale yellow; postnotum pale whitish gray, narrowly blackened medially. Pleura dull brownish yellow. Halteres brownish yellow, the knobs darker. Legs with the coxæ brownish yellow; trochanters yellow; femora light brown with a broad, subterminal, brown annulus, the extreme tip paler; tibiæ light brownish, the tips narrowly dark brown; tarsi dark brown. Wings nearly hyaline; stigma distinct, oval, dark brown. Venation: *Sc* long, extending to about two-fifths the length of the sector; *Rs* elongate, almost straight.

Abdominal tergites dark brown, narrowly margined caudally and laterally with dull yellow; basal sternites dull yellowish, more brown on the intermediate segments. Male hypopygium with the penis-guard very long and prominent.

Habitat.—Guatemala.

Holotype, ♂, Aguna, Guatemala; altitude 2,000 feet (Dr. G. Eisen).

Allotype, ♀, topotypic.

Type in the collection of the United States National Museum.

This species differs from the Nearctic *G. canadensis* in the clear gray head, in the subterminal brown femoral ring, not with a black tip as in *canadensis*, the long penis-guard, etc.

Geranomyia knabiana sp. n. (Extra-limital.)

Related to *canadensis* Westwood; rostrum elongate, black; head dark brown; thorax brownish yellow, the præscutum with a broad median stripe; femora with an indistinct brown ring before the tip; wings with subcosta very long.

Female.—Length, excluding the rostrum, about 4.2 mm.; wing, 5 mm.; rostrum, about 2.8 mm.

Rostrum elongate, dark brownish black. Antennæ dark brown, moderately elongated. Head dark brown with a narrow median black line; head constricted behind.

Mesonotal præscutum brownish yellow, brighter in front, with a very broad median stripe that is pale anteriorly, dark brown behind; in the Aguna paratype the præscutum is scarcely marked at all, in the allotype the stripe is distinct for its entire length; lateral stripes not clear; scutum brownish yellow medially, the lobes dark brown; scutellum pale dirty yellow; postnotum brown. Pleura brownish yellow. Halteres short, dark brown, the stem more yellowish. Legs with the coxæ and trochanters dull yellow; femora yellowish brown with a very indistinct brownish subapical annulus; tibiæ dull yellow, darkening into brown at the tip; tarsi dark brown. Wings hyaline, the stigma oval, brown; veins dark brown. Venation: *Sc* very long, extending to two-thirds the length of the sector; Sc_2 at the tip of Sc_1; *Rs* moderately long, a little over two times the basal deflection of R_{4+5}.

Abdominal tergites brown; sternites yellow, the basal segments a little darker.

Habitat.—Central America.

Holotype, ♀, Canal Zone, Panama (A. H. Jennings).

Allotype, ♂, Aguna, Guatemala, altitude 2,000 feet (Dr. G. Eisen).

Paratypes, ♀, with the allotype; ♀, Antigua, Guatemala, September, 1902 (Dr. G. Eisen).

Type in the collection of the United States National Museum.

Similar to *G. canadensis*, but smaller, the femora without a black tip, the præscutal pattern more distinct behind, etc.

This interesting little species is dedicated to Frederick Knab, custodian of the Diptera in the United States National Museum, as an appreciation of his studies on the feeding habits of this genus of crane-flies.

Geranomyia distincta Doane. (Plate XXV, fig. 2.)

Geranomyia distincta Doane; Journal of the New York Entomological Society, vol. 8, p. 186 (1900).

This fly will probably be found to have a wide range throughout the central and eastern United States, it being now known from Connecticut and New Jersey to Texas.

Geranomyia vanduzeei sp. n.

Related to *distincta* Doane; rostrum moderate in length; head pale gray; thorax reddish brown without stripes; wings clear without a

distinct stigmal spot; femora dark brown before the tip, tibiæ black at the tip.

Male.—Length, excluding the rostrum, about 6.5 mm.; wing, 6.6 mm.; rostrum, about 2.5 mm.

Female.—Length as above, about 5 mm.; wing, 6 mm.; rostrum, about 1.8 mm.

Rostrum moderate in length, brownish yellow, darker towards the tip. Antennæ with the first segment brownish yellow, the remainder of the antennæ dark brownish black; flagellar segments short-oval. Head light gray, more yellowish behind.

Thorax reddish brown without distinct stripes or markings of any kind, the scutellum a little more yellow. Pleura pale reddish brown with a very sparse grayish bloom. Halteres short, pale yellow, the knobs a little darker. Legs with the coxæ reddish; trochanters dull yellow; femora dull yellow with a broad brownish annulus immediately before the tip; tibiæ brownish yellow, the extreme tip black; tarsi yellowish brown, the apical segments darker. Wings nearly hyaline; stigma indistinct; veins dark brown, *C*, *Sc* and *Cu* a little more yellowish. Venation: *Sc* long, extending over one-half the length of the radial sector.

Abdominal tergites dull yellow with a narrow, poorly indicated, brown sublateral line; sternites yellowish, on the terminal segments more reddish.

The female is quite similar to the male, but smaller with a still shorter rostrum that is not so noticeably pallid basally; abdominal tergites brown, the last tergite more yellowish.

Habitat.—Southeastern United States.

Holotype, ♂, Braidentown, Manatee County, Florida, March (M. C. Van Duzee).

Allotype, ♀, with the type.

Paratopotypes, 2 ♂ ♀.

The type is in the collection of Mr. Van Duzee, to whom the species is respectfully dedicated.

In its unmarked thorax this species runs closest to *G. distincta* which has a longer rostrum and lacks the dark markings on the femora and the black apices to the tibiæ.

Geranomyia intermedia Walker. (Plate XXV, fig. 3.)

Limnobia intermedia Walker; List Diptera British Museum, vol. 1, p. 47 (1848).

The following specimens are at hand:

A ♀, Kingston, Jamaica, February 10, 1903 (M. Grabham), a ♀,

same locality and collector, April 9, 1903; a ♂, ♀, Havana, Cuba, April, 1900 (J. R. Taylor). The species may be looked for in the Miami section of Florida.

The ground-color of the thorax is yellowish, the stripes usually indistinct, somewhat plumbeous, the middle stripe narrowly divided. The banded abdomen offers an easy recognition character.

Geranomyia diversa Osten Sacken. (Plate XXV, fig. 4).

Geranomyia diversa Osten Sacken; Proceedings of The Academy of Natural Sciences of Philadelphia, p. 207 (1859).

Northeastern and central United States, ranging from Maine to Virginia, west to Arkansas.

At "The Rocks" wharf on the James River, Virginia, while a member of the second trip of the "Ecphora," under Prof. Gilbert D. Harris, of Cornell University, in quest of Tertiary fossils, I found this species in large numbers resting on the dripping, water-spattered cliffs of the Yorktown (upper Miocene) formations. On July 2, 1915, they occurred in large numbers, together with *Dicranomyia badia* Walker. Many were found to be heavily infested with a species of *Trombidium*, while others, in large numbers, were found beaten into the mud by being struck by the heavy particles of water dripping from above.

In the north (Ithaca, New York) they occur in mid-summer (August) on rich vegetation along streams. The adult flies feed on various Composite flowers (*Solidago*, *Erigeron*) and also on *Daucus* (Umbelliferæ).

A ♀ specimen, Little Rock, Arkansas, July 11, 1904 (H. S. Barber).

Geranomyia domingensis sp. n. (Extra-limital.)

Related to *cinereinota* Alexander; rostrum short; head black, enclosing a silvery triangle; præscutum brownish gray with a broad blackish median line; wings nearly hyaline, stigma indistinct; vein *Sc* moderate in length.

Female.—Length, excluding the rostrum, about 5.2 mm.; wing, 5.5 mm.; rostrum, about 1.6 mm.

Rostrum very short, black, palpi biarticulate, black. Antennæ with the first segment black; segment two dark brown; flagellum brownish black with a whitish pubescence; first scapal segment elongated; second segment subglobular; flagellar segments oval. Head velvety-black, enclosing a large silvery triangle with its point directed cephalad.

Mesontal præscutum brownish gray with a broad blackish median line; lateral stripes less distinct, broad, brownish; scutum brown,

the lobes scarcely darker than the median area; scutellum pallid; postnotum plumbeous brown with a sparse grayish bloom. Pleura reddish yellow with a light gray bloom. Halteres yellow, the knobs brown. Legs with the coxæ and trochanters dull yellow; femora uniform light brown; tibiæ and tarsi dark brown. Wings nearly hyaline; stigma indistinct; veins dark brown. Venation: *Sc* moderate in length, extending to about one-fourth the length of the sector; *Rs* elongate, somewhat arcuated at its origin; cross-vein *r* at the tip of R_1; basal deflection of R_{4+5} more than two times the length of the *r-m* cross-vein; cell *1st* M_2 elongated, the cell being longer than vein Cu_1 beyond it, though shorter than vein M_{1+2} beyond it; basal deflection of Cu_1 just before the fork of *M*.

Abdominal tergites dark brown, the sternites rather light yellow.

Habitat.—Santo Domingo.

Holotype, ♀, San Francisco Mountains, Santo Domingo, September, 1905 (Aug. Busck).

Type in the collection of the United States National Museum.

This species is closely related to *G. cinereinota* in its short rostrum, conspicuous black thoracic stripe, uniform femora, etc.; it is a smaller fly, with the head black and silvery, without the clear gray coloration of the præscutum, the stigma indistinct and the flagellar segments much shorter and more globular than in the corresponding sex of *cinereinota*.

Geranomyia tibialis Loew. (Plate XXV, fig. 5.)

Aporosa tibialis Loew; Linnæa Entomologica, vol. 5, p. 397 (1851).

A wide-ranging species throughout the Antilles and southward over a large portion of South and Central America. The following unrecorded stations are before me, representing the Loew collections in the Museum of Comparative Zoology, the American Museum and the United States National Museum:

Cuba, part of the Loew collection in the M. C. Z., bearing the label "*rufescens*" in Osten Sacken's writing, but certainly not that species because of the black and enlarged apices of the anterior tibiæ; a ♂, Baracoa, September, 1901 (Aug. Busck).

Santo Domingo, several ♂ ♀, Sanchez, June 7–12, 1915; ♂, San Francisco Mountains, September, 1905 (Aug. Busck).

Porto Rico, ♀, Aguadilla, January, 1899.

Montserrat, a ♀, Plymouth (F. Driver).

Canal Zone, a ♀ (A. H. Jennings).

The species may be looked for in the Miami (Dade County) section of Florida.

Geranomyia lachrymalis Alexander. (Plate XXV, fig. 6.)

Geranomyia lachrymalis Alexander; Transactions of the American Entomological Society, vol. 42, pp. 9, 10 (1916).

The following additional distributional records:

Mexico, Cordoba, April 1, 1908 (Knab).

Guatemala, Escuintla, November 12, 1902 (Eisen).

Costa Rica, Cache, March 3, 1910 (Calvert).

Canal Zone, Tabernilla (Busck).

Geranomyia certhia sp. n. (Extra-limital).

Rostrum elongate; head dark gray; præscutum yellow with three dark brown stripes; legs with the femora and tibiæ tipped with dark brown; wings hyaline with a prominent oval stigma; cord and outer end of cell *1st* M_2 seamed with pale brown; abdomen brown with two black longitudinal dorsal stripes.

Male.—Length, excluding the rostrum, 6 mm.; wing, 7 mm.; rostrum, about 5 mm.

Female.—Length as above, 6.5 mm.; wing, 8.4 mm.; rostrum, about 5 mm.

Rostrum dark brownish black, long and slender, especially toward the tip. Antennæ short, black. Head gray, brighter just behind the antennæ; vertex dark gray with an impressed black line that is narrowed behind; occiput suffused with dull yellow.

Mesonotal præscutum pale buff-yellow with three broad, dark brown stripes, the median one double, ending just before the suture; lateral stripes shorter, crossing the suture and suffusing the scutal lobes; remainder of the scutum buff-yellow; scutellum buff-yellow, a little obscured on either side; postnotum light plumbeous brown with a very delicate impressed median line. Pleura yellow with a sparse pale gray bloom. Halteres yellow, the knobs darker brown. Legs with the coxæ and trochanters dull yellow; femora brownish yellow, the tips broadly dark brown; tibiæ light brown, the tips narrowly dark brownish black; tarsi brown. Wings hyaline, the stigma prominent, oval, dark brown; cord and outer end of cell *1st* M_2 narrowly seamed with pale brown; apex of the wing a little darkened; veins dark brown. Venation: *Sc* long, ending about opposite mid-length of the sector.

Abdominal tergites dark brown, the segments paler, yellowish, laterally, more blackish sublaterally, forming two dorsal black lines down the abdomen; sternites brownish yellow.

Habitat.—Guatemala.

Holotype, ♂, Antigua, Guatemala, September, 1902 (Dr. G. Eisen).

Allotype, ♀, with the type.

Paratopotypes, 3 ♂ ♀.

Type in the collection of the United States National Museum.

This well-marked species suggests *G. enderleini* Alexander (*annulata* Enderlein) in its large size and long rostrum, but differs in the wing-pattern, the darker apices to the femora and tibiæ and the two longitudinal black bands on the abdomen, not annulated as in that species.

Geranomyia virescens Loew.

Aporosa virescens Loew; Linnæa Entomologica, vol. 5, p. 398 (1851).

The following records for this fly admitting it to the United States fauna:

Biscayne Bay, Dade County, Florida (Mrs. Slosson).

Miami, Dade County, Florida (Knab), December 24, 1914, feeding on the blossoms of *Persea* (*Lauraceæ*).

Geranomyia rostrata Say. (Plate XXV, fig. 7.)

Limnobia rostrata Say; Journal Academy Natural Sciences Philadelphia, vol. 3, p. 22 (1823).

This species ranges over the eastern United States and Canada, from Maine and Canada to Florida, west to Illinois and Louisiana. What has been determined as this species ranges over the Antilles and the records for the Greater Antilles, at least, are probably correct. Knab's records show this species to feed on various Composite flowers (*Eupatorium, Solidago* and *Helianthus*).

Geranomyia ibis sp. n.

Related to *insignis* Loew; head gray with two black lines; præscutum grayish with three narrow black lines; pleura gray; femora yellowish apically with a subterminal brown annulus; wings nearly hyaline with a sparse darker pattern.

Female.—Length, excluding the rostrum, 7 mm.; wing, 7.3 mm.; rostrum, 2.3 mm.

Rostrum rather short, black. Antennæ black, the flagellar segments short-oval. Head gray with two linear, parallel, black marks extending from the vertex to the occiput.

Pronotum brownish gray, shiny black on the dorso-median line. Mesonotal præscutum pale reddish gray, with three very narrow black stripes, the median stripe only a little broader than the lateral stripes, narrowed caudally and not attaining the suture; lateral stripes long, slightly convergent and more brownish behind, crossing the suture and occupying the proximal edge of the scutal lobes;

scutum, scutellum and postnotum reddish gray. Pleura uniform gray. Halteres short, yellow, the knobs brown. Legs with the coxæ brownish yellow; trochanters yellow; femora brown, the basal and apical quarters yellowish, a rather broad, brown subterminal ring; tibiæ and tarsi dark brown. Wings almost hyaline, the costal area pale yellow; stigma rounded, pale brown; a darker brown spot at the tip of *Sc* and at the origin of *Rs;* a very indistinct seam along the cord. Venation (Plate XXV, fig. 8): *Sc* rather long, ending at about one-third the length of the sector.

Abdominal tergites brown, the sternites more yellowish.

Habitat.—South-central United States.

Holotype, ♀, Hot Springs, Arkansas, June 26, 1904 (H. S. Barber).

Type in the collection of the United States National Museum.

Differs from *G. insignis* Loew (Plate XXV, fig. 9) in the more grayish ground-color of the præscutum with still narrower stripes, the clear gray pleura and the paler wing-pattern; differs from *plumbeipleura* Alexander in the very narrow præscutal stripes, these stripes not as wide as the interspaces, the pale scutal lobes and the pale wing-pattern; from *numenius* Alexander it differs in the much shorter rostrum.

Geranomyia costaricensis sp. n. (Extra-limital.)

Related to *insignis* Loew; mesonotal præscutum with two approximated dorsal brown stripes; pleura yellow with a large brown mark on the mesopleurites; femora with the apex broadly yellow, with a narrow subterminal ring; wings subhyaline with four dark brown subcostal marks and paler seams to the veins.

Female.—Length, excluding the rostrum, 8 mm.; wing, 7.8 mm.; rostrum, about 3.3 mm.

Rostrum moderately elongated, dark brownish black. Antennæ with the first segment black with a sparse grayish bloom; second segment brownish, paler toward the tip; flagellar segments black, elongate-oval. Head brownish gray.

Mesonotal præscutum clear light yellow with two broad reddish brown dorsal stripes, one on either side of the very narrow middle line, these stripes barely attaining the suture; lateral margin of the sclerite brown, widely separated from the median stripes; scutum with the median area broadly yellowish white, the lobes brown; scutellum pale; postnotum yellowish brown. Pleura dull yellow, a large brown blotch on the mesopleurites and a similar one on the lateral portions of the postnotum. Halteres yellow, the knobs brown. Legs with the coxæ and trochanters light yellow; femora

brownish yellow, the apices broadly light yellow with a dark brown subterminal ring, this ring about one-half the extent of the pale tip; tibiæ yellowish brown; tarsi brown. Wings with a pale grayish suffusion, with brown clouds and seams as follows: larger ones at the stigma, at the tip of *Sc* and origin of *Rs*, midlength of the subcostal cell and at the base of this cell; paler brown clouds at the tips of most of the veins, the cross-veins and deflections seamed with this same color. Venation: *Sc* long, extending to about one-third the length of the sector; basal deflection of R_{4+5} very long, the cross-vein *r-m* correspondingly reduced.

Abdominal tergites dark brown, the segments a little brighter at their bases; sternites dull yellow.

Habitat.—Costa Rica.

Holotype, ♀, Cartago, Costa Rica, September 17, 1909 (P. P. Calvert).

Type in the collection of the American Entomological Society.

This species differs from all the members of the *insignis* group (*insignis, lineata, numenius, plumbeipleura, ibis, et al.*) in the peculiar pattern of the præscutum.

Geranomyia subinsignis sp. n. (Extra-limital.)

Related to *insignis* Loew; thorax grayish with three broad dark brown stripes; femora with a broad subterminal brown annulus; wings grayish with extensive brown markings.

Female.—Length, excluding the rostrum, 5.7–6 mm.; wing, 6.4 mm.; rostrum, about 2.2–2.5 mm.

Rostrum moderately elongated, black. Antennæ black. Head black, passing into dark gray on the vertex; a narrow silvery median line extends from the front to the occiput.

Pronotum dull brownish yellow with a dark brown median line. Mesonotal præscutum light gray with three dark brown stripes, nearly subequal in width and much broader than the pale interspaces; middle stripe narrowed behind, barely attaining the suture; lateral stripes narrowed in front, broadened behind, crossing the suture and suffusing the scutal lobes; median area of the scutum and the scutellum pale dirty brown; postnotum brown. Pleura brownish plumbeous. Halteres yellow, the knobs brown. Legs with the coxæ and trochanters pale yellow; femora light brown, passing into light yellow at the tip, this pale area including a broad dark brown subterminal annulus; in the Panaman paratype, the brown annulus is very broad, encroaching upon the yellow tip; the pale area at the tip is about one-half the extent of the brown annulus, which in turn

is a little longer than or subequal to the yellow area proximad to it. Wings with a pale gray tinge, the costal margin with three dark brown blotches, the largest at the origin of *Rs* and the tip of *Sc*; stigma rectangular; a large blotch at the middle of *Sc*; pale brown seams along the cross-veins and deflections of veins; tip of the wing a little darkened; veins dark brown, *R* between the brown markings bright yellow. Venation: *Sc* rather short, extending to about one-quarter the length of the sector; Sc_2 at the tip of Sc_1; basal deflection of R_{4+5} long, restricting the *r-m* cross-vein.

Abdominal tergites dark brown, the ninth segment more yellowish; sternites yellowish brown, the apical segments more yellowish.

Habitat.—Central America.

Holotype, ♀, Aguna, Guatemala, altitude 2,000 feet (Dr. G. Eisen).

Paratopotype, ♀; paratype, ♀, Cucaracha, Canal Zone, November 17, 1908, No. 14 (C. H. Bath).

Type in the collection of the United States National Museum.

Related to *insignis* Loew, but smaller, the thorax grayish with the brown stripes broader, the subterminal brown annulus on the femora much broader, the wings grayish with the brown markings larger and darker; it is a much smaller species than *plumbeipleura* (wing and body, over 8 mm.; rostrum, 3 mm.) with the mesonotal coloration more grayish, the wings with the pattern not so dark, but more extensive, the interspaces of the costal region not so brightened, etc.

Tribe **Antochini.**

This is one of the smaller of the crane-fly tribes, the species of the eastern United States and Canada being as follows:

Antocha saxicola Osten Sacken.

Canadian and Transitional zones of the east, ranging from Ontario and Quebec, south to Georgia, west to Winnipeg, Michigan and Illinois. In New York and New England it flies from May 13 to September 25.

Atarba picticornis Osten Sacken.

Canadian-Transitional and Transitional zones of the eastern United States, ranging from New York and Massachusetts, south to Virginia and North Carolina, west to Indiana and Tennessee. In New York and New England it flies from June 19 to July 13, having an unusually short flight-period. In the south it flies later (October 7, Tennessee) and appears earlier (May 29, Maryland).

Dicranoptycha germana Osten Sacken. (Plate XXV, fig. 10.)

Canadian life-zone of the northeastern United States, ranging from New York, Vermont and New Hampshire, south, in the moun-

tains, to North Carolina. In New York and New England it flies from June 21 to August 8, being quite common in late June and throughout July on vegetation in cool wooded places, usually along streams.

Dicranoptycha nigripes Osten Sacken.

Known only from the type-locality, Dalton, Georgia.

Dicranoptycha sobrina Osten Sacken. (Plate XXV, fig. 11.)

Transitional and Austral life-zones, wide-ranging throughout the northern portions of the United States, from Ontario and New York, south to North Carolina, west to British Columbia, California and New Mexico. In the vicinity of Washington it flies from April 20 to August 31, while in the northeastern part of its range (New York and Ontario) it appears even later, August 30 to September 20.

Dicranoptycha winnemana sp. n. (Plate XXV, fig. 12.)

Transitional life-zone, ranging from Maryland to Georgia.

Elephantomyia westwoodi Osten Sacken.

Canadian and Canadian-Transitional life-zones of northeastern United States and eastern Canada, ranging from Ontario, Quebec, and Nova Scotia, south to North Carolina, west to Wisconsin. In New York and New England it flies from June 5 to August 13, being common throughout late June and July.

Rhamphidia albitarsis Osten Sacken.

Tropical life-zone, ranging from Santo Domingo, through the Antilles to St. Vincent and British Guiana; also in Central America. It may possibly occur in the Miami section of Florida.

Rhamphidia flavipes Macquart. (Plate XXV, fig. 13.)

Wide-ranging throughout the eastern parts of North America, from Ontario, and Quebec south to Georgia and Florida, west to Manitoba, Wisconsin, Missouri and Texas. In New York and New England, it flies from May 29 to August 29; in the southern parts of its range much earlier (Florida, March 14; Texas, March 18).

Rhamphidia mainensis sp. n. (Plate XXV, fig. 14.)

Canadian-Transitional life-zone of the northeastern United States, ranging from Maine to Maryland, west to Illinois.

Teucholabis carolinensis Alexander.

Lower Austral life-zone, known only from the type-locality, Georgetown, South Carolina, August 19, 1915.

Teucholabis complexa Osten Sacken. (Plate XXV, fig. 15.)

Transitional and Austral life-zones of the eastern United States, ranging from New York and Connecticut, south to Georgia, west to Illinois and Kentucky. In the vicinity of Washington it flies from May 7 to July 25.

Teucholabis lucida Alexander. (Plate XXV, fig. 16).

Known only from the type-locality, District of Columbia, August 22, 1915.

Toxorrhina magna Osten Sacken.

Austral life-zones of the southeastern United States, ranging from New Jersey south to Florida; in New Jersey flying from July 19 to August 12, in the south its flight-period being much more extensive (Crescent City, Florida, April 21; Thalman, Georgia, April 28; Bainbridge, Georgia, September, October).

Toxorrhina muliebris Osten Sacken.

Canadian-Transitional life-zones of the northeastern United States, ranging from New York and Maine, south to Maryland, west to Michigan. In New York and New England it flies from June 21 to August 8, being common in places in late June and throughout July.

RHAMPHIDIA Meigen.

Rhamphidia Meigen; Systematische Beschreibung, vol. 6, p. 281 (1830).

Rhamphidia mainensis sp. n.

Rostrum elongated; head light gray with a large brown blotch between the eyes; præscutum light yellowish brown with three dark brown stripes; wings unmarked except the pale stigma; legs dark brown; abdomen dark brown, the basal sternites and the hypopygium yellowish.

Male.—Length, 6–7.5 mm.; wing, 5.8–7.7 mm.

Rostrum elongated, black. Antennæ black, the second segment a little paler apically. Head light gray with a large brown blotch between the eyes.

Mesonotal præscutum light yellowish brown with three dark brown stripes, the middle one broadest, double, becoming indistinct before the suture; lateral stripes shorter, crossing the suture and suffusing the scutal lobes except behind; median area of the scutum and the scutellum pale yellowish gray; postnotum yellowish, darker, more brownish, on the sides. Pleura brownish with a golden-yellow pollen. Halteres light brown, the knobs dark brown. Legs with the coxæ and trochanters yellowish brown; femora dark brown, a little paler basally; tibiæ and tarsi dark brown. Wings sub-

hyaline, the stigma indistinct, brownish; veins dark brown, subcosta more yellowish. Venation (Plate XXV, fig. 14) *Rs* moderate in length, about one and one-half the length of the deflection of R_{4+5}; cell *1st* M_2 small to elongate; basal deflection of Cu_1 variable in position, before, at or beyond the fork of *M*.

Abdominal tergites dark brown, the hypopygium bright reddish yellow; sternites two to five dull brownish yellow basally, the caudal margins dark brown; segments six to seven dark brown; eight and nine dull yellow.

The Maryland paratype is strikingly smaller (the smallest measurements given) than the typical Maine material and has the stigma more distinct, but is undoubtedly the same species.

Habitat.—Northeastern United States.

Holotype, ♂, Orono, Penobscot County, Maine, June 12, 1913 (Alexander).

Paratopotypes, 4 ♂'s; paratype, ♂, Hyattsville, Maryland, September 1, 1912 (Malloch); ♂, Lake Forest, Illinois, July 8, 1906 (Needham).

Type in the collection of the author.

This species differs conspicuously from the only other eastern species of the genus, *R. flavipes* Macquart (Plate XXV, fig. 13), in the elongate rostrum, the uniformly dark legs, the clear wings and the abdominal coloration. It is much more closely related to *R. longirostris* Meigen (western Palæarctic region) which has the antennal flagellar segments more elongated with longer verticils, the thorax differently patterned, the wings broader with a higher cell *1st* M_2, etc.

ATARBA Osten Sacken.

Atarba Osten Sacken; Monographs of the Diptera of North America, pt. 4, p. 127 (1869).

Atarba cincticornis sp. n. (Extra-limital.)

Atarba varicornis Alexander (in part); Transactions of the American Entomological Society, vol. 40, p. 232 (1914).

Antennæ of the male greatly elongated, the flagellar segments bicolored, the basal half of each segment black, the apical half yellow, the segments with long outstretched hairs; cell *1st* M_2 of the wings very small.

Male.—Length, 4.2 mm.; wing, 5 mm.

Rostrum and palpi reddish. Antennæ with the basal segment reddish; second segment dark brown; flagellar segments with the basal half to three-fifths black, the remainder of each segment light yellow; fourth segment largely blackish; flagellar segments with

long outstretched hairs; antennæ very elongated, nearly as long as the body, the individual segments of the flagellum being greatly elongated. Head reddish yellow.

Mesonotum reddish yellow with an impressed median line on the præscutum. Pleura reddish with a very sparse grayish bloom. Halteres yellowish, the knobs darker at their tips. Legs with the coxæ and trochanters dull yellow; femora yellow, narrowly and indistinctly brownish at the tips; tibiæ brownish yellow; tarsi yellowish brown, the tips of the segments brown, the two terminal segments entirely brown. Wings with a grayish yellow tinge, stigma very indistinct, grayish; veins brown. Venation: *Sc* ending about opposite the origin of *Rs*; *Rs* short, a little longer than the basal deflection of R_{4+5}; cell *1st* M_2 small.

Abdominal segments dull yellow, brownish laterally; a brownish black subterminal ring.

Habitat.—British Guiana.

Holotype, ♂, Mallali, Demerara River, British Guiana, March 25, 1913 (H. S. Parish).

Type in the collection of the author.

A. cincticornis is to be separated from the other species of the genus with bicolored antennæ in that it is the basal half of the flagellar segments that is black instead of the apical half (as in *picticornis* Osten Sacken, *varicornis* Alexander).

DICRANOPTYCHA Osten Sacken.

Dicranoptycha Osten Sacken; Proceedings of The Academy of Natural Sciences of Philadelphia, p. 217 (1859).

Dicranoptycha winnemana sp. n.

Altogether pale brownish yellow; wings pale yellow, the costal margin fringed with long golden hairs; radial sector about one and one-half the length of cell *1st* M_2.

Male.—Length, 6.8–7.2 mm.; wing, 7–7.6 mm.

Female.—Length, 7.8–8.8 mm.; wing, 8.2–8.8 mm.

Rostrum and palpi brown, the latter darker. Antennæ with the first segment dark brown, grayish pubescent; second segment dark brown; flagellum dull yellow. Head light gray.

Mesonotal præscutum clear light brownish yellow without stripes; scutellum and postnotum a little more yellowish. Pleura pale reddish yellow. Halteres short, yellow. Legs with the coxæ and trochanters pale yellow; femora and tibiæ yellow; tarsi similar with the four terminal segments and the tips of the metatarsi light brown. Wings with the membrane tinged with yellow, the veins light brown;

costal margin and the veins in the costal field with a fringe of long golden hairs. Venation (Plate XXV, fig. 12): *Rs* elongate, about one-half longer than the cell *1st* M_2.

Abdominal segments brownish yellow with a subterminal brownish black ring in the male, lacking in the female.

Habitat.—Eastern United States.

Holotype, ♂, Maryland, near Plummers Island, July 21, 1915 (Alexander).

Allotype, ♀, Plummers Island, Maryland, July 21, 1915 (Alexander).

Paratopotypes, 1 ♂, 10 ♀'s, (McAtee and Alexander); paratype, ♀, Dead Run, Virginia, July 21, 1915 (McAtee); ♂, Lost Mountain, Cobb County, Georgia, July 13, 1913 (Bradley).

Type in the collection of the author.

This is probably the species that Osten Sacken referred to when he said "immature specimens of a paler coloring (than *sobrina*), with uniformly pale feet, and without any trace of a darker tinge near the apex of the wings often occur."[3] These specimens do not represent teneral insects, but fully colored specimens of both sexes, some of them taken in copulation. Besides the pale coloration, the elongate sector will distinguish the species from *sobrina* (Plate XXV, fig. 11).

Tribe **Eriopterini.**

ERIOPTERA Meigen.

Erioptera Meigen; Illigers Magazine, vol. 2, p. 262 (1803).

Erioptera (Erioptera) laticeps sp. n.

Head very broad; coloration dark, the humeral triangles pale; pleura marked with brown and yellow; abdomen banded brown and white; wings nearly hyaline.

Male.—Length, 4.6 mm.; wing, 3.8 mm.

Female.—Length, 5 mm.; wing, 4 mm.

The specimens are described from alcoholic material.

Rostrum and palpi dark brown. Antennæ dark brown, the flagellar segments short-oval, more elongated toward the tip of the organ. Head very broad, especially behind; frontal tubercle distinct. Head dark grayish brown, paler brown on the genæ.

Mesonotal præscutum dark brown, the region before the pseudosutural foveæ light yellow, triangular in outline; remainder of the mesonotum dark brown, the scutellum yellow. Pleura mottled brown and brownish yellow, the sternal region more brownish; a

[3] Monographs of the Diptera of North America, pt. 4, p. 119 (1869).

group of about twenty long pale hairs on the caudal margin of the mesepimeron just cephalad of the halteres. Halteres pale yellow throughout, the knobs large. Legs with the coxæ and trochanters brown; femora dark brown; tibiæ and tarsi, especially the terminal segments of the latter, paler brown. Wings subhyaline, the stigma indistinct; veins brown. Venation (Plate XXVII, fig. 34).

Abdominal tergites one and two dark brown, three to eight dark brown, broadly margined caudally and more narrowly on the sides with pale yellowish white, giving the organ a banded appearance; pleural integument pale; sternites similar to the tergites, but paler brown. Male hypopygium (Plate XXXI, fig. 97) with the pleurites short and stout, the pleural appendages a dorsal cylindrical fleshy lobe and a more ventral acute chitinized point with a smaller chitinized lobe on its ventral face; ninth tergite concave on the caudal margin, underneath with two stout, chitinized lobes that are decussate.

The female has the tergal valves of the ovipositor long, strongly upcurved, chitinized, brown; sternal valves short, pale, acutely pointed.

Habitat.—Western United States.

Holotype, ♂, Blue Lake, Humboldt County, California, June 20–27, 1907 (Bradley).

Allotype, ♀, with the type.

Paratopotypes, 4 ♂'s.

Type in the collection of Cornell University.

Erioptera (Mesocyphona) tantilla sp. n.

Vertex unicolorous; mesonotum brown with three narrow blackish stripes; femora pale with a narrow, indistinct, subterminal band; costal region of the wings dark with tiny spots at the ends of *Sc*, R_1, R_2 and R_3; caudal cells of the wings with gray spots; cell *1st* M_2 closed.

Male.—Length, 4.5 mm.; wing, 3.6 mm.

Rostrum and palpi light brown. Antennæ reddish yellow, the flagellum a little more brownish; flagellar segments very slender with elongate verticils. Head brownish yellow without distinct markings, the vertex with numerous long hairs.

Mesonotal præscutum light brownish gray medially, more yellowish laterally, the central portion delimited on either side by an indistinct narrow brown line; a still darker narrow brown median line, interrupted at the level of the tuberculate pits; scutum with the lobes pale indistinctly marked with brown; an oblique row of about seven

bristles crosses the lobe with a smaller group on the proximal margin of the lobe; scutellum dark reddish brown, distinctly and rather broadly light yellow medially, the sides of the sclerite also passing into yellowish; postnotum brownish gray with an indistinct narrow brown median line. Pleura brownish yellow with a narrow brown pleural stripe; the sternal region a little paler brown. Halteres short, brown. Legs with the coxæ light brown; trochanters dull yellow; femora light brown, the apical quarter more yellowish and enclosing a narrow brown subterminal annulus; tibiæ dull brownish yellow, the tips and the tarsi broken. Wings with the apical costal portion dark brown, the basal costal portion and the caudal portions of the membrane much paler, subhyaline; cells *C* and *Sc* with a few scattered brown spots; a small white spot at the tip of Sc_1, at the tip of R_1, and near the tips of R_2 and R_3; the hyaline areas of the wings with a rather dense but pale pattern of small spots and blotches, brownish in the radial field, passing into grayish on the caudal fields of the wings. Venation (Plate XVII, fig. 35) cell *1st* M_2 closed, the outer deflection of M_3 and cross-vein *m* being present.

Abdominal tergites brownish yellow with abundant long pale hairs; sternites yellowish gray, indistinctly trivittate with brown, the segments with abundant pale brown setigerous punctures.

Habitat.—Southeastern United States.

Holotype, ♂, Jackson, Mississippi, August 8 (H. S. Barber).

Type in the collection of the United States National Museum.

Similar to *E. costalis* Alexander,[4] but the cell *1st* M_2 closed and the wing-pattern much heavier in the costal region.

Erioptera (Empeda) nyctops sp. n.

Pale yellow throughout; wings with *Sc* long; vein R_2 oblique; cross-vein *r* present; cell *1st* M_2 closed with the basal deflection of Cu_1 beneath it.

Male.—Length, 3.8–3.9 mm.; wing, 4.3–4.4 mm.

Female.—Length, 3.8–4 mm.; wing, 4.5–4.7 mm.

Rostrum light yellow, palpi brown. Antennæ with the scapal segments pale yellow, the flagellum light brown. Head bright light yellow. Eyes large, black.

Mesonotal præscutum pale reddish yellow, unmarked, more yellowish laterally; tuberculate pits pale, remote from the anterior margin of the sclerite (as in *Erioptera*); remainder of the mesonotum more shiny. Pleura light yellow. Halteres pale yellowish, the

[4] Proceedings of the United States National Museum, vol. 44, p. 517 (1913).

knobs brown. Legs with the coxæ and trochanters dull yellow; femora brown, a little paler basally; tibiæ and tarsi brown. Wings subhyaline, stigma indistinct, veins pale brownish yellow. Venation (Plate III, fig. 36): *Sc* long, ending beyond the fork of the sector; Sc_1 about four to six times as long as Sc_2; *Rs* long, gently arcuated; cross-vein *r* present, connecting with R_{2+3} at about one-third its length; R_2 oblique (as in *Gonomyia subcinerea*); cell *1st* M_2 closed; basal deflection of Cu_1 at about one-third to one-fourth the length of the cell.

Abdomen brownish yellow, the sternites paler yellow. Male hypopygium (Plate XXXI, fig. 98) with the pleurites moderately slender, broader basally, bearing three appendages, the largest appendage (*a*) very elongate, digitiform, with numerous long scattered hairs on raised tubercles, the apex a little flattened, blunt, this appendage decussate with its fellow of the opposite side; the two smaller appendages are slender, one (*b*) directed proximad, decussate, pale, the tip drawn out into a long point; the third appendage (*c*) slender, directed cephalad, slightly enlarged beyond the middle, the tip subacute. Penis-guard rectangular, on the ventral side running out into a sharp, median chitinized point. In a position of rest the large finger-like appendages lie parallel and are more or less approximated, but not decussate, directed strongly ventrad.

Females have the eyes smaller, the præscutum more yellowish; ovipositor powerful, the valves elongate, upcurved toward the tips.

Habitat.—Northeastern United States.

Holotype, ♂, Mountain Lake, Fulton County, New York, altitude 1,600 feet, June 13, 1916 (Alexander).

Allotype, ♀, Buell Mountain, Fulton County, New York, altitude 1,800 feet, June 18, 1916.

Paratopotypes, 2 ♂'s, 35 ♀'s.

Type in the collection of the author.

The holotype occurred on rich vegetation along a small temporary stream flowing into the lake on June 13. Associated with the species at this time were the following crane-flies: *Dicranomyia pubipennis, Ormosia rubella, Erioptera* (*Empeda*) *stigmatica, Limnophila toxoneura, L. areolata, L. nigripleura, L. brevifurca, L. rufibasis, L. sylvia, Ulomorpha pilosella, Rhaphidolabis* (*Rhaphidolabis*) *tenuipes, R.* (*Rhapidolabina*) *flaveola, R.* (*Plectromyia*) *modesta, Tricyphona vernalis, T. calcar, Dolichopeza americana, Oropeza venosa, Tipula senega, T. iroquois,* and *T. hermannia.*

The allotype and several of the paratypes occurred along a small temporary torrent pouring down the eastern slopes of Buell Mountain

on June 18. Associated with this species were the following craneflies: *Dicranomyia pubipennis, Limnobia indigena, Limnophila niveitarsis, L. toxoneura, L. areolata, L. adusta, L. brevifurca, L. rufibasis, L. munda, L. montana, L. lenta, L. emmelina, Ula elegans, Rhaphidolabis* (*Rhaphidolabina*) *flaveola, Dolichopeza americana, Tipula senega, T. hermannia, T. macrolabis* and *T. valida.*

This interesting pallid species gave some trouble in assigning it to this genus The general appearance of the fly is altogether that of *Gonomyia*, but the presence of the radial cross-vein, the very elongate subcosta and the position of the tuberculate pits make it more probable that the present reference is the correct one. In its venation it departs widely from that of the genotype, *E. stigmatica* Osten Sacken (Eastern Nearctic), in the oblique, *Gonomyia*-like course of vein R_2, in this respect suggesting certain of the European Empedæ. These insects with the oblique R_2 certainly appear different from *stigmatica*, and if this difference were worthy of a name it is this group that would have to be separated off from *stigmatica*, the genus *Empeda* being erected for the species with the short cell R_2 and the normal, *Erioptera*-like course of vein R_2. This *Gonomyia-Erioptera* group of species gets more complex with the accession of new forms, and it seems probable that the best basis for a division is the position of the tuberculate pits, these being far cephalad in the *Gonomyia*-like forms and retreated far backward and lying at nearly mid-length of the sclerite in the genera and subgenera related to *Erioptera.*

MOLOPHILUS Curtis.

Molophilus Curtis; British Entomology, p. 444 (1833).

Molophilus fultonensis sp. n.

Much larger and darker colored than *M. pubipennis* to which it is most closely related; antennæ of the female much longer than in the corresponding sex of *pubipennis.*

Male.—Length, 3.5–4.4 mm.; wing, 5.6–6.4 mm.

Female.—Length, 4.5–5 mm.; wing, 5.3–6 mm.

Very similar to the smaller *M. pubipennis* Osten Sacken, differing as follows: much larger and darker colored, especially in the male sex, the abdomen being dark brown instead of yellow; thorax without the rich reddish tints of *pubipennis;* pronotum not bright yellow as in *pubipennis.* Hypopygium with two chitinized hooks (Plate XXXI, figs. 95, 96), the curved hook directed abruptly ventrad, ending in a long slender point; the smaller straight one is more dorsad in position, minutely denticulated along the ventral face; proximo-lateral angle

produced into a sharp point. Hypopygium quite as in *pubipennis*, but the ventral hook is more blackened, chitinized, and the point is longer, more slender; dorsal hook more slender, not so blackened, the sharp point on the proximo-lateral angle not so long.

The female has the antennæ much longer than in this sex of *pubipennis*, the flagellar segments dark brown, not yellowish, the terminal segments darkened; flagellar segments elongate-oval instead of merely oval; wings (Plate XXVII, fig. 37) with the anterior margin and apex with a fringe of reddish brown to dark brown hairs, not bright yellow as in *pubipennis*.

Habitat.—Northeastern United States.

Holotype, ♂, Mountain Lake, Fulton County, New York, altitude 1,600 feet, July 7, 1916 (Alexander).

Allotype, ♀, with the type.

Paratopotypes, 15 ♂♀'s; paratypes, 1 ♂, Taylor, Cortland County, New York, altitude 1,200 feet, July 20, 1916, 2 ♂'s, near Cincinnatus, Chenango County, New York, altitude 1,300 feet, July 21, 1916.

Type in the collection of the author.

A large striking species, the largest yet discovered in the eastern States.

The types occurred on rich vegetation along a small temporary stream flowing into the lake. This is the same locality described under *Erioptera nyctops*, but by this date (July 7) the stream had disappeared and the mid-summer crane-fly fauna was quite different from that found less than four weeks before. The principal species recorded now were the following: *Dicranomyia immodesta*, *D. pubipennis*, *D. macateei*, *Elephantomyia westwoodi*, *Erioptera chrysocoma*, *E. chlorophylla*, *E. armillaris*, *E. armata*, *E. caloptera*, *E. stigmatica*, *Molophilus pubipennis*, *M. ursinus*, *Limnophila fuscovaria*, *L. quadrata*, *Bittacomorpha jonesi*, etc.

Molophilus nova-cæsariensis sp. n.

Size small (wing under 3.2 mm.); coloration dark brownish black; wings dusky with the fusion between Cu_1 and M_3 slight; hypopygium of the male with the ventral appendages straight, slender, heavily chitinized.

Male.—Length about 2.7 mm.; wing, 2.8 mm.

Rostrum and palpi blackish. Antennæ rather elongated, dark brown, the flagellar segments cylindrical with an abundant long pale pubescence. Head dark gray.

Mesonotum black with a sparse grayish bloom; pleura dark brown-

ish black, the dorso-pleural membranes a little brighter. Halteres short, dull yellow throughout, the knobs elongate. Legs with the coxæ brown, the trochanters yellowish brown; femora and tibiæ dark brown, the former a little brighter at the base; tarsi light brown, the tips of the segments and all of the terminal two segments darker. Wings with a dusky suffusion, the costal and stigmal regions a little more suffused; veins dark brown. Venation (Plate XXVII, fig. 38): first deflection of R_2 elongate, oblique, not perpendicular as in *ursinus* (Plate XXVII, fig. 39); fusion of M_3 and Cu_1 slight, shorter than the free portion of Cu_1 alone.

Abdomen dark brownish black with a long pale pubescence. Hypopygium narrowed, the ventral appendage very long, slender, acicular and almost straight, heavily chitinized.

Habitat.—Eastern United States.

Holotype, ♂, Ashland, Camden County, New Jersey, May 13, 1905.

Type in the collection of the United States National Museum.

This species occurred in the United States National Museum collection, bearing the label "*M. ursinus ?*" in Coquillett's writing. *M. ursinus* Osten Sacken, probably the smallest crane-fly in the United States (wing of the male, 2.4 mm.), is the only species with which it might be confused; the venation of the two species is quite distinct, that of the new species being much more of the normal *Molophilus* type. *M. ursinus* (Plate XXVII, fig. 39) has the upward deflection of R_2 almost perpendicular and in a line with the radial cross-vein; basal deflection of Cu_1 before the fork of M, the fusion of Cu_1 and M_3 being correspondingly extensive, longer than the free portion of Cu_1 alone; there is a clear, hyaline area running along the anterior face of vein M, this obliterating the base of M_{1+2}; *M. novacæsariensis* (Plate XXVII, fig. 38) has the upward deflection of R_2 elongate, oblique; basal deflection of Cu_1 about at the fork of M, the fusion of Cu_1 and M_3 being very slight, not more than one-half the free portion of Cu_1 alone; there is no hyaline obliterative mark along vein M and the base of M_{1+2} is distinct.

EMPEDOMORPHA gen. n.

Head with the front broad, the eyes widely separated. Rostrum short. Palpi four-segmented, the segments subequal. Antennæ 16-segmented, the second segment not longer and only a little broader than the third; flagellar segments oval with verticils just below mid-length; terminal segments smaller. Legs moderately stout, the

segments with abundant strong hairs; tibiæ without spurs. Wing (of the male) (Plate XXVII, fig. 40) with the stigma enormously enlarged so that the costal and radial veins in that field are bulged outward; stigma extending from the basal portion of cell R_1 to the end of vein R_1; wing (of the female) with the stigma smaller, the cells R_1 not so wide and the cross-vein r consequently shorter and more nearly straight. *Sc* moderately long, ending just before the fork of *Rs*; Sc_2 far retreated, lying just beyond the origin of *Rs*; *Rs* long, straight, in a line with R_{4+5}; cross-vein r long, oblique, somewhat twisted, inserted at the end of *Rs* or just beyond on R_{2+3}; R_{2+3} about as long as R_2 alone; R_2 arcuated at its base; cell *1st* M_2 closed (sometimes open by the atrophy of cross-vein *m*, which, when present, is usually weak); basal deflection of Cu_1 at or just before the fork of *M*; fusion of Cu_1 and M_3 moderate, about one-half of Cu_1 alone or a little longer than the deflection of Cu_1.

Genotype.— *? Trimicra empedoides* Alexander. (Mid-western Nearctic region.)

Empedomorpha empedoides Alexander.

? Trimicra empedoides Alexander; Canadian Entomologist, vol. 48, pp. 44, 45 (1916).

This curious fly ranges from South Dakota to Texas and New Mexico, an unrecorded station being Brownsville, Texas, May 3, 1904 (H. S. Barber), a ♀ in the collection of the United States National Museum.

GONOMYIA Meigen.

Gonomyia Meigen; Systematische Beschreibung, vol. 1, p. 146 (1818).

The numerous species of this genus may be divided into three subgenera, *Gonomyia*, *Gonomyella* and *Leiponeura*, and it is the last-named group that has caused so much confusion in the study of crane-flies during the past few years, the species having been described in a wide range of Limnobine and Antochine genera (*Dicranomyia*, *Atarba*, *Elliptera*, *Teucholabis*, *Thaumastoptera*, etc.).

Brunetti, in his exhaustive work on the "Diptera Nematocera of British India," pp. 469, 470, enters into a long discussion as to the homologies of the veins of those species of *Gonomyia* which have but two branches of the sector reaching the wing-margin, *i.e.*, the subgenus *Leiponeura* Skuse. He presents the rather far-fetched idea of the cell R_2 being unusually large, sessile and the vein R_{4+5} lacking so that cross-vein *r-m* connects M_{1+2} with R_3. A study of a series of the species of the genus show the impossibility of this interpretation, R_{4+5} being one of the most constant veins of the wing in

the Tipulidæ. It is much more reasonable to figure out the disappearance of one of these branches by fusion to the wing-margin, a condition found in many remote crane-fly tribes (Limnophilini, the Neotropical genus *Psaronius* Enderlein; Hexatomini, the genus *Hexatoma* and the reduced form, *Cladolipes*, Palæarctic, etc.). In the genus *Gonomyia* we may start with forms possessing a deep cell R_2 and the radial cross-vein present as in the subgenus *Gonomyella* Alexander (*slossonæ* Alexander) through species with the cell a little less deep [*subcinerea* group (Nearctic), Plate XXVI, fig. 33; *affinis* Brunetti (Oriental) *et al.*]; then to still smaller forked species (*noveboracensis*, Plate XXVI, fig. 30; *aperta* Brunetti) and finally to a group of species that have the cell very tiny (*sulphurella* group, Plate XXVI, fig. 26; *flavonotata* Edwards of the Seychelles Islands *et al.*), a single step further in the fusion of R_{2+3} resulting in the obliteration of the cell and the attainment of the condition found in *Leiponeura* (Plate XXVI, figs. 17–22). With this fusing of the branches of R_{2+3} there occurs a simultaneous tendency for R_{4+5} to bend caudad toward the wing-apex so that in the species of *Leiponeura* these two branches of the radial sector are very widely separated at the wing-margin. It is a very easy matter to pick out the species of this group merely by this one tendency alone, a correlated character, however, being the extremely narrowed, often almost pointed, inner end of cell *1st* M_2 due to the extreme shortening of the basal deflection of M_{1+2}.

Dr. Bergroth has expressed his belief that although *Gonomyia manca* Osten Sacken is a true, though aberrant, member of the genus, the other species that have been described in various Antochine genera, such as *Atarba*, *Elliptera*, *Leiponeura*, etc., are quite distinct from *manca* and really belong to the tribe Antochini. The series of *Leiponeura*, as they occur in the United States alone and without taking into consideration the rest of the world, show a curious and almost complete transition into the *sulphurella* group of *Gonomyia* s.s. I would point out the exceedingly long verticils of the flagellar segments of the male antennæ that are found not only in the species of *Leiponeura* (*manca*, *pleuralis et al.*), but also in *Gonomyia sulphurella*, another proof of the close relationship existing, since this condition of the antennæ elsewhere in the family is rare or lacking.

Occasionally a crane-fly society is found in which the dominant element consists of species of this genus. Such a society was found in the Shaul woods on the east bank of Nowadaga Creek (Castle Creek) south of the village of Indian Castle, Herkimer County, New York, June 13, 1915, and may be described as a *Gonomyia*-association.

The woods are quite open, in places with outcroppings of a transitional character, of Trenton limestones and Utica shales and with a western exposure. The forest cover consists of the dominant arbor-vitæ, *Thuja occidentalis*, with an admixture of *Juglans cinerea*, *Betula lutea*, *Ulmus americana*, *U. fulva*, *Tilia americana*, *Fraxinus americana* and a few others. The underbrush was of yew, *Taxus canadensis*, *Ribes Cynosbati* and *Hamamelis virginiana*. The undergrowth from which the crane-flies were swept consisted of three dominant plants, early meadow-rue, *Thalictrum dioicum*, mandrake, *Podophyllum peltatum*, and ground ivy, *Nepeta hederacea*, with fewer representatives of other species, *Ranunculus abortivus*, *R. acris*, *Fragaria vesca*, and an abundance of bladder-fern, *Cystopteris bulbifera*. In places rank growths of *Osmunda cinnamomea*, *Podophyllum*, *Solidago*, *Lysimachia Nummularia*, bound into dense tangles by lianas, *Menispermum canadense* and *Psedera quinque-folia*. Here occurred *Gonomyia mathesoni*, *Rhabdomastix* (*Sacandaga*) *flava* and *Erioptera venusta*. Along the base of the hill is a broad ditch, now quite dry, but supporting such a flora as *Cystopteris*, *Lysimachia Nummularia*, *Tussilago Farfara*, etc. It is very probable that a certain element of the crane-fly fauna emerged from this ditch. The similarity between the crane-fly fauna of this open woods and that of Sport Island in the Sacandaga River, Fulton County, New York, is very close (*Gonomyia alexanderi*, *G. cognatella*, *G. mathesoni*, *Rhabdomastix flava*, etc.).

The crane-fly fauna of this association is as follows:

Dicranomyia liberta, sev.; *Geranomyia canadensis*, rare; *Antocha saxicola*, few; *Erioptera venusta*, comm.; *E. armata*, comm.; *Molophilus pubipennis*, comm.; *Gonomyia alexanderi*, uncomm.; *G. sulphurella*, dom.; *G. mathesoni*, dom.; *G. cognatella* and *G. florens*, loc. abund.; *G. subcinerea*, uncomm.; *Rhabdomastix* (*Sacandaga*) *flava*, uncomm.; *Adelphomyia minuta*, uncomm.; *Limnophila rufibasis*, comm.; *Tipula caloptera*, rare, and *T. macrolabis*, rare.

Sport Island in the Sacandaga River, New York (mentioned above), is rather remarkable in its *Gonomyia* fauna, no less than eight species having been taken here (*G. alexanderi*, *G. sacandaga*, *G. manca*, *G. sulphurella*, *G. cognatella*, *G. mathesoni*, *G. noveboracensis* and *G. subcinerea*), as well as the closely related genus, *Rhabdomastix* (*Sacandaga*) *flava* Alexander. The floral conditions obtaining here have been discussed by the author in an earlier paper.[5]

[5] *Entomological News*, vol. 23, p. 72 (1912).

A Key to the Nearctic Species of Gonomyia.

1. Two branches of the radial sector attain the wing-margin ..... (Subgenus *Leiponeura* Skuse.) 2
   Three branches of the radial sector attain the wing-margin 7
2. Outer deflection of M_3 absent, the cell *1st* M_2 being open 3
   Outer deflection of M_3 present, the cell *1st* M_2 being closed 4
3. Costa conspicuously china-white; legs banded with white; male hypopygium with the dorsal pleural appendage triangular, the caudal angle a prominent elongate spine; ventral pleural appendage a flattened blade whose inner caudal margin is armed with about five or six acute chitinized appressed teeth, of which the innermost is the largest. (Eastern United States.) ..... *alexanderi* Johnson.
   Costa not conspicuously china-white; legs without white bands; male hypopygium with the dorsal pleural appendage broadly triangular, the caudal angle a short spine; ventral pleural appendage a flattened blade bearing near its dorsal inner side a sharp chitinized point; no serrations along the lobe. (Western United States.) ..... *cinerea* Doane.
4. Pleural stripes conspicuous; stigma distinct 5
   Pleural stripes indistinct or feebly indicated; stigma lacking or very faint 6
5. Legs with the femora tipped with dark brown; costal margin of the wings conspicuously light yellow, the stigma pale brown. (Northeastern United States.) ..... *sacandaga* Alexander.
   Legs with the femora indistinctly darkened at the tip; costal margin of the wings not yellow, the stigma dark brown. (Southeastern United States and southward.) ..... *pleuralis* Williston.
6. Pleura plumbeous with a pale yellow stripe; male hypopygium with the pleural appendage armed with a strongly curved hook. (Southeastern United States and southward.) ..... *puer* Alexander.
   Pleura unstriped, pale; male hypopygium with the pleural appendage very elongate, slender, decussate in a position of rest, the inner face at the apex with a strong bristle. (Eastern United States.) ..... *manca* Osten Sacken.
7. Radial cross-vein present (subgenus *Gonomyella* Alexander) (Southeastern United States and southward.) ..... *slossonæ* Alexander.
   Radial cross-vein lacking (subgenus *Gonomyia* Meigen) 8
8. Basal deflection of Cu_1 far before the fork of M; subcosta long, ending beyond the origin of Rs 9
   Basal deflection of Cu_1 at or beyond the fork of M; subcosta short, ending opposite or far before the origin of Rs 11
9. Wings clear. (Northeastern United States.) ..... *mathesoni* Alexander.
   Wings spotted 10

10. Pleura unstriped; *Sc* rather short, extending to about one-fourth the length of the sector; no dark blotch at the tip of Sc_1; apices of cells R_3 and R_5 largely darkened. (Eastern United States.) ..... *blanda* Osten Sacken.

    Pleura striped with brown; *Sc* long, ending at about half the length of the sector; a dark blotch at the tip of Sc_1; apices of cells R_3 and R_5 only slightly darkened. (Western United States.) ..... *californica* Alexander.

11. Antennæ orange at the base, the flagellum dark 12

    Antennæ black throughout 15

12. Cell *1st* M_2 closed; femora with a dark brown subterminal annulus. (Eastern United States.) ..... *sulphurella* Osten Sacken.

    Cell *1st* M_2 open; femora without a darker subterminal annulus 13

13. *Sc* short ending before the origin of *Rs*, this distance being about equal to the vein R_2. (Western United States.) ..... *flavibasis* Alexander.

    Sc longer, ending opposite, or just before, the origin of *Rs* 14

14. Male hypopygium with the dorsal angle of the pleurite stout, with numerous (about fifteen) slender hairs; ventral appendage simple, stout, tipped by a blunt black spine; second appendage a powerful, curved, subchitinized arm directed proximad. (Northeastern United States.) ..... *floreus* Alexander.

    Male hypopygium with the dorsal angle of the pleurite slender, with a few (about ten) stout hairs; ventral appendage bifid, the arm with a long slender black spine; second appendage a slender pale arm that is almost straight, with two hairs at the tip. (Eastern United States.) ..... *cognatella* Osten Sacken.

15. Wings with slender veins, clouded with a milky suffusion; *Rs* very long and straight. (Northwestern North America.) ..... *galactoptera* Bergroth.

    Wings with stouter veins, pale gray to hyaline; *Rs* shorter, more arcuated basally 16

16. Subcosta short, ending before the origin of *Rs*, the distance about equal to the *r-m* cross-vein; vein R_2 oblique, a little longer than the cross-vein *r-m*; male hypopygium with the gonapophyses and penis-guard fused into a large, prominent, cylindrical tube. (Northeastern United States.) ..... *noveboracensis* Alexander.

    Subcosta longer, ending about opposite the origin of *Rs*; vein R_2 longer, the cell R_2 being larger; male hypopygium with the gonapophyses and penis-guard not fused into a cylindrical tube 17

17. Wings long and slender with a strong grayish brown suffusion; halteres elongated; male hypopygium with the ventral pleural appendage very elongate, slender, slightly expanded toward the tip. (Eastern Rocky Mountain region.) ..... *filicauda* Alexander.

    Wings broader, not strongly tinged with grayish; halteres shorter male hypopygium with the ventral pleural appendage not strikingly elongated 18

18. Male hypopygium with the dorsal pleural appendage armed with a chitinized hook 19

Male hypopygium with the dorsal pleural appendage without a hook, although with two powerful bristles at the tip 20

19. Male hypopygium with the dorsal appendage two lobed, the caudal arm a powerful chitinized spine; ventral arm with a sharp, chitinized, feebly curved spine. (Eastern United States.) ..... *subcinerea* Osten Sacken.

Male hypopygium with the dorsal appendage irregular, not two lobed, the outer face near the apex with a strong, curved, chitinized hook. (Extra-limital; Guatemala.) ..... *æqualis* Alexander.

20. Male hypopygium with the ventral appendage prominent, directed caudad, narrowed at the base, the apex a slight chitinized tooth directed proximad. (Western United States.) *virgata* Doane.

Male hypopygium not as described 21

21. Male hypopygium with the ventral appendage a double, dark-colored lobe, the inner arm stout-cylindrical; the outer arm slender, curved, bearing at the tip two divergent hairs; penis-guard subtended by two divergent chitinized arms that are acute at their tips. (Extra-limital; Guatemala.) ..... *unicolor* Alexander.

Male hypopygium with the ventral appendage pale, not chitinized; penis-guard long and pale, the apex bifid by a deep U-shaped notch; the divergent subtending arms are slender, the ventral margin with a few sharp, appressed teeth. (Extra-limital; Mexico.) ..... *mexicana* Alexander.

Subgenus LEIPONEURA Skuse.

The Cinerea Group.

Gonomyia (Leiponeura) alexanderi Johnson.

Elliptera alexanderi Johnson; Psyche, vol. 19, p. 3, fig. 6 (1912).

This handsome little fly is locally common. Its known distribution over the eastern United States is as follows:

New York, Fulton County, Sport Island, Sacandaga River, June 11, 1914, to August 24, 1910 (Alexander), the type-locality; Herkimer County, Indian Castle, June 13, 1915 (Alexander).

North Carolina, Buncombe County, Black Mountains, June 13, 1912 (Beutenmuller).

A female specimen from Plano, Collin County, Texas, in August (E. S. Tucker), probably belongs here, but may possibly represent *G. helophila* Alexander. This is also the species mentioned by Osten Sacken in the Monographs, part 4, p. 179, without locality.

The wing is shown on Plate XXVI, fig. 17.

The male hypopygium is described below, the characters being largely taken from paratypic material in my collection. Hypopygium (Plate XXIX, figs. 59, 61) with the pleurites rather prominent, cylindrical; ventral pleural appendage (*v*) elongate, the outer angle produced caudad as a rather broad flattened blade that is slightly chitinized at the tip; inner caudal margin of the appendage with about five or six acute chitinized appressed teeth, of which the innermost is the largest; a fleshy lobe on the ventral side of the outer blade; middle pleural appendage lacking (possibly of a caducous nature); dorsal pleural appendage (*d*) lying on the inner caudal angle of the pleurite, triangular in outline, the caudal angle produced caudad as an elongate spine that is heavily chitinized apically, the inner angle a rounded lobe with numerous setigerous tubercles.

The two Nearctic species, *alexanderi* and *cinerea*, have been distinguished by the key given before. There is a third species, *G. helophila* Alexander,[6] that is even closer to *alexanderi*. Its known range is extra-limital (Lesser Antilles and British Guiana to Peru), but it may range into our southern limits. The two species may be separated as follows:

1. Dorsal pleural appendage triangular, the caudal angle a prominent spine that is heavily chitinized apically; middle pleural appendage apparently lacking; ventral pleural appendage with a broad flattened blade, the inner caudal margin with about five or six acute chitinized appressed teeth, of which the innermost is the largest (Plate XXIX, fig. 59). (Nearctic.) *alexanderi* Johnson.

   Dorsal pleural appendage a fleshy lobe bearing many hairs; middle pleural appendage a slender subsinuous spine; ventral pleural appendage with the apex flattened, smooth, chitinized, bilobed; ventral margin of the appendage with two prominent teeth whose margins are minutely denticulate. (Plate XXIX, fig. 60). (Neotropical.) ..... *helophila* Alexander.

Gonomyia (Leiponeura) cinerea Doane

Dicranomyia cinerea Doane; Journal of the New York Entomological Society, vol. 8, pp. 182, 183, Pl. 7, fig. 2 (1910).

The known range of this species is as follows:

Washington, Whitman County, Pullman, August 10, 1898 (Piper); the type-locality.

California, Humboldt County, Blue Lake, June 20–27, 1907 (Bradley).

The wing is shown on Plate XXVI, fig. 18.

[6] *Entomological News*, vol. 27, pp. 343–346, figs. 1, 3 (1916).

The male has never been described, and this specimen is made the allotype.

Allotype, ♂.—Rostrum and palpi dark brown. Antennæ with the basal segments enlarged, the second segment as large as or larger than the first; flagellar segments small, brown. Head pale with a broad dark brown mark on the vertex sending a small median tongue backward onto the occiput.

Pronotal scutum dark medially. Mesonotal præscutum light brown with three dark brown stripes, the median one split by a narrow vitta of the ground-color; scutum with the lobes dark brown. Pleura pale yellow, striped with brown; a very short brown dorsal stripe extending from the pronotum back to above the fore coxæ; second stripe beginning at the fore coxa extending caudad to the base of the halter; ventral stripe broadest, including the sterna and the bases of the middle and hind coxæ; the pale stripe enclosed broad, extending to the abdomen. Halteres pale. Legs with the coxæ pale; trochanters darker; remainder of the legs broken. Wings hyaline or nearly so, the veins brown; basal deflection of R_{4+5}, *r-m* and the basal deflection of Cu_1 dark brown; a pale brownish gray oval stigma. Venation (Plate XXVI, fig. 18) with *Rs* short, straight, oblique, a little longer than the *r-m* cross-vein; basal deflection of Cu_1 at the fork of *M*.

Male hypopygium (Plate XXIX, fig. 62) with the pleurites rather prominent, cylindrical; ventral pleural appendage (*v*) elongate, flattened, blade-like, the apex chitinized; a rounded lobe on the inner ventral side just before the apex; at the base on the inner dorsal side, a sharp, acute, chitinized point; middle appendage a slender, slightly curved pale hook, directed inward, the apex slightly chitinized; dorsal pleural appendage (*d*) a subtriangular lobe, the caudal angle produced caudad as a short spine, heavily chitinized at the apex, the inner angle prominent, produced slightly cephalad, with numerous setigerous punctures.

Allotype in the collection of Cornell University.

The type is grayish, this color being produced by a pruinosity that is not shown by the alcoholic allotype.

The Pleuralis Group.

Gonomyia (Leiponeura) sacandaga Alexander.

Gonomyia sacandaga Alexander; Proceedings of The Academy of Natural Sciences of Philadelphia, pp. 587, 588, Pl. 27, fig. 25 (wing); Pl. 26, fig. 21 (hypopygium) (1914).

This species is still known only from the type station where it is common.

New York, Fulton County, Sport Island in the Sacandaga River, June 11, 1914, to August 24, 1910; the type-locality.

The wing is shown on Plate XXVI, fig. 19.

The hypopygium having been described and figured in the first part of this series is not repeated here.

Gonomyia (Leiponeura) pleuralis Williston.

Atarba pleuralis Williston; Transactions of the Entomological Society of London, p. 289, Pl. 10, fig. 61 (1896).

This is a tropical species that reaches our southern limit, its range being as follows:

Bermuda, apparently common (Jones).

Georgia, Charlton County, Okefinokee Swamp, June 20, 1912 (Bradley).

Cuba, Baracoa, September, 1901 (Busck).

Porto Rico, Aguadilla, January, 1899 (Busck).

St. Vincent (H. H. Smith); the type-locality.

British Guiana, Bartica, December 9, 1912, to February 26, 1913; Mallali, March 14, 1913 (Parish).

The wing is shown on Plate XXVI, fig. 20.

The male hypopygium has been described and figured by the author in another paper.[7]

The Manca Group.

Gonomyia (Leiponeura) puer Alexander.

Gonomyia puer Alexander; Proceedings of the United States National Museum, vol. 44, p. 506, Pl. 66, fig. 14 (1913).

This is likewise a tropical species that ranges within our limits, its northern distribution being a little more extensive than the last.

South Carolina, Georgetown County, South Island, August 19, 1915 (Alexander); Charleston County, McClellanville, August 8, 1915 (Alexander).

Georgia, Charlton County, Okefinokee Swamp, June 20 to 25, 1912 (Bradley).

Florida, Dade County, Miami, December 19, 1912 (Knab).

Santo Domingo, San Francisco Mountains, August, September, 1905 (Busck); the type-locality.

British Guiana, Bartica, January 3, 1913, to January 10, 1913 (Parish).

The wing is shown on Plate XXVI, fig. 21.

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[7] *Entomological News*, vol. 23, pp. 418–420; figs. 3, 4 (1912).

The male hypopygium (Plate XXIX, fig. 63) with the pleurites very elongated, broader at the base, tapering to the obliquely truncated apex which bears on the inner side a single appendage shaped as a curved hook, bent proximad, dorsad and finally cephalad, the apex acute and strongly chitinized. Anal tube broad, pale, bifid by a deep median notch, the adjacent lobes rounded. Penis-guard (*p.gd.*) very elongate, slender, tapering gradually to the acute apex, at the base on the ventral side with an oval fleshy lobe covered with setigerous punctures on the ventral face.

Gonomyia (Leiponeura) manca Osten Sacken.

Gonomyia manca Osten Sacken; Monographs of the Diptera of North America, part 4, pp. 178, 179 (1869).

A rather wide-ranging species throughout the eastern United States:

New York, Fulton County, Sacandaga Park, August 26, 1916 (Alexander).

New Jersey, Essex County, South Orange, June 30, 1868 (Osten Sacken); the type-locality.

Maryland, Montgomery County, Forest Glen, June 1, 1913 (Knab); Plummers Island, August 18, 1912 (Viereck).

District of Columbia, Washington (Coquillett's types of *Dicranomyia curvivena*).

Virginia, Fairfax County, Great Falls, August 23, 1908 (Knab); Difficult Run, July 25, 1915 (McAtee and Alexander); Glencarlyn, May 28 (Banks).

North Carolina, Jones County, Pollocksville, July 8, 1915 (Alexander); Onslow County, Camp Perry, July 9, 1915 (Alexander); Buncombe County, Black Mountains, June 24, 1912 (Beutenmuller).

South Carolina, Charleston County, McClellanville, August 8, 1915 (Alexander).

Georgia, Decatur County, Bainbridge, September, October, 1910 (Bradley).

The wing is shown on Plate XXVI, fig. 22.

The male hypopygium is of the type of *G. puer* Alexander, *G. inermis* Alexander *et al.* It is shown on Plate XXIX, figs. 64, 65; the pleurites are exceedingly elongated, slender, tapering to the narrow apex, the outer face with many long hairs, on the inner face at the apex with a strong bristle; pleurites in a position of rest, decussate. Penis-guard (*p.gd.*) long and slender, acute, tapering to an acute point, subtended on either side by a flattened blade, ending in a triangular black hook that is bent slightly dorsad at the apex.

Subgenus GONOMYELLA Alexander.

Gonomyia (Gonomyella) slossonæ Alexander.

? Gonomyia slossonæ Alexander; Proceedings of The Academy of Natural Sciences of Philadelphia, pp. 588, 589, Pl. 27, fig. 26 (1914).

A tropical species that ranges into the southeastern United States:

South Carolina, Georgetown County, South Island, August 19, 1915 (Alexander).

Florida, Seminole County, Sanford, May 7, 1908 (M. C. VanDuzee); Dade County, Biscayne Bay (A. T. Slosson); the type-locality.

Panama, Paraiso, January 29, 1911 (Busck).

Subgenus GONOMYIA Meigen.

The Blanda Group.

Gonomyia (Gonomyia) mathesoni Alexander.

Gonomyia mathesoni Alexander; Entomological News, vol. 26, pp. 170–172, figs. 1–3 (1915).

A species of the northeastern United States and eastern Canada:

Nova Scotia, Truro, July 7 to 26, 1913 (Matheson).

New York, Fulton County, Sacandaga Park, June 12 to 16, 1914 (Alexander), the type-locality; Herkimer County, Indian Castle, June 13, 1915 (Alexander); Cortland County, Taylor, July 20, 1916 (Alexander); Tompkins County, Ithaca, August 24, 1912 (Alexander).

The wing is shown on Plate XXVI, fig. 23.

The hypopygium of the male has been described and figured in the paper cited above.

Gonomyia (Gonomyia) blanda Osten Sacken.

Gonomyia blanda Osten Sacken; Proceedings of The Academy of Natural Sciences of Philadelphia, p. 231 (1859).

This handsome fly ranges over the eastern United States:

New Hampshire, Rockingham County, Hampton, July 15, 1907 (S. A. Shaw).

Vermont, Chittenden County, Burlington, June 23, 1906 (Johnson).

Connecticut, New Haven County, East River, July 16 to 20, 1910 (Ely).

New York, Albany County, Albany, June 26, 1912 (D. B. Young); Herkimer County, Trenton Falls, (Osten Sacken), the type-locality; Cortland County, Taylor, July 20, 1916 (Alexander); Tompkins County, Ithaca, July 19, 1912 (Alexander).

District of Columbia, Washington (Osten Sacken); the type-locality.

Virginia, Fairfax County, Falls Church, June 7, 1914 (Shannon).

South Carolina (in the Berlin Museum).

Georgia, Rabun County, Clayton, altitude 2,000 feet, May 18, 1911 (Bradley).

Michigan, Walnut Lake, June 26 to 28, 1907 (Needham).

Colorado, Clear Creek County, June 27, 1915 (Oslar).

The wing is shown on Plate XXVI, fig. 24.

The male hypopygium (Plate XXIX, figs. 68, 69) with the pleurites stout, the outer angle produced caudad into a long, fleshy, finger-like lobe, blunt at the apex, provided with numerous tubercles; ventral pleural appendage (*v*) large, prominent, being chitinized and bifid, the caudal or outer arm longer, slender, the diameter uniform, the apex subacute; cephalic or inner arm shorter, expanded distally into a broad, truncated apex; dorsal pleural appendage (*d*) a subtriangular fleshy lobe whose inner angle is produced into a prominent chitinized curved horn; the cephalic inner margin with about six hair-bearing tubercles. Ninth tergite with the caudal margin transversely concave, not notched medially. Penis-guard very slender.

Gonomyia (Gonomyia) californica Alexander.

Gonomyia californica Alexander; Canadian Entomologist, vol. 48, pp. 324, 325 (1916).

This is the western representative of the *blanda* group:

British Columbia, Peachland, May 19, 1912.

California, Humboldt County, Blue Lake, June 20 to 27, 1907 (Bradley); the type-locality.

The wing is shown on Plate XXVI, fig. 25.

The male hypopygium (Plate XXIX, figs. 66, 67) with the pleurites stout, outer angle produced caudad into a slender, fleshy lobe, pointed at the apex and sparsely provided with setigerous tubercles; ventral pleural appendage (*v*) a two-armed chitinized rod whose outer ventral arm is stout basally, narrowed toward the apex which is again expanded into a blunt tip; the inner arm bends dorsad, slender, tapering into an acute blackened apex; dorsal pleural appendage (*d*) a triangular fleshy lobe provided with long, coarse hairs. Ninth tergite with a deep, narrow, median notch the lateral angles rounded. Penis-guard (*p.gd.*) prominent, the sides subparallel, the apical half on the dorsal surface with numerous hairs, the apex produced ventrocaudad into a prominent median lobule.

The Sulphurella Group.

Gonomyia (Gonomyia) sulphurella Osten Sacken.

Gonomyia sulphurella Osten Sacken; Proceedings of The Academy of Natural Sciences of Philadelphia, p. 230 (1859).

A wide-ranging species throughout eastern North America:

Ontario, Fort Erie, May 30, 1911 (M. C. Van Duzee); Point au Barile, Georgian Bay, July 11, 1914 (R. B. Hughes).

Nova Scotia, Truro, July 7 to August 16, 1913 (Matheson).

Maine, Oxford County, Fryeburg, September 5, 1913 (Alexander).

Vermont, Windsor County, Norwich, July 8, 1908 (Johnson).

Connecticut, Middlesex County, Middletown, June 17, 1909 (Johnson); New Haven County, East River, July 11, 1910 (Ely).

Rhode Island, Washington County, Kingston, September 23, 1907 (Johnson).

New York, Fulton County, Sacandaga Park, June 11, 1914, to August 24, 1910 (Alexander); Herkimer County, Trenton Falls (Osten Sacken), the type-locality; Indian Castle, June 13, 1915 (Alexander); Tompkins County, Ithaca, May 13 to August 24, 1912 (Alexander); Westchester County, Tarrytown, June 9, 1914 (Frost); Nassau County, Sea Cliff, August (Banks).

Pennsylvania, Luzerne County, Hazleton, August 30, 1910 (Dietz).

New Jersey, Cumberland County, Shiloh, June 19, 1915 (Alexander).

Maryland, Prince George County, Hyattsville, August 2, 1908 (Knab).

District of Columbia, Washington (Osten Sacken), the type-locality; May 15, 1909 (Knab).

Virginia, Alexandria County, Rosslyn, May 11, 1913 (Knab); Fairfax County, Dead Run, May 21, 1914 (Shannon); Difficult Run, July 25, 1915 (McAtee and Alexander); Glencarlyn, June 28 (Banks).

North Carolina, Onslow County, Camp Perry, July 9, 1915 (Alexander).

Georgia, Rabun County, Clayton, May 20, 1911 (Bradley).

Louisiana, DeSoto County, Logansport, March 24, 1908 (Tucker).

Texas, Collin County, Plano, May, 1907 (Tucker).

The wing is shown on Plate XXVI, fig. 26.

The male hypopygium (Plate XXIX, fig. 70) with the pleurites elongate, the outer angle produced proximad, dorsad and caudad as a very elongate, slender, irregularly curved and feebly chitinized hook which tapers gradually to an acute point; dorsal pleural appendage (*d*) a cylindrical fleshy lobe, narrowed toward the apex which terminates in a bristle; ventral pleural appendage (*v*) bifid, the dorsal arm short, densely provided with short hairs on the inner face; ventral arm very long, slightly curved, blade-like, the tip subacute, the arm directed proximad, decussate with its mate of the opposite side. Penis-guard stout, fleshy, near the apex on the ventral sur-

face, a chitinized, median appendage directed caudad and slightly ventrad, at the acute apex turned strongly dorsad.

The Cognatella Group.

Gonomyia (Gonomyia) flavibasis Alexander.

Gonomyia flavibasis Alexander; Canadian Entomologist, vol. 48, pp. 317–319 (1916).

A western species that is still known only from the type-locality, Monterey County, California, July 18, 1896.

The wing is shown on Plate XXVI, fig. 27.

The male hypopygium (Plate XXX, figs. 76–78) with the pleurites long and slender, the dorsal angle produced caudad as a flattened, fleshy lobe that bears many hairs on the dorsal face; first pleural appendage very long, flattened, the apex bent, the appendage with many long, prominent hairs; second appendage complex, consisting of a chitinized hook that is slightly bent; underneath the base of this hook is a fleshy lobe with several short bristles on the outer face, including two powerful bristles at the apex; above the base of the hook is a slender, subchitinized rod that is darkened at the tip.

Gonomyia (Gonomyia) florens Alexander.

Gonomyia florens Alexander; Canadian Entomologist, vol. 48, pp. 316, 317 (1916).

A fly of cold Canadian conditions in the northeastern United States:

Maine, Penobscot County, Orono, July 12, 1913 (Alexander).

New York, Fulton County, Sacandaga Park, June 18, 1916 (Alexander); Gloversville, June 22, 1916 (Alexander); Herkimer County, Indian Castle, June 9 to 13, 1915 (Alexander), the type-locality; Tompkins County, McLean, June 5, 1916 (Alexander).

The wing is shown on Plate XXVI, fig. 28.

The male hypopygium (Plate XXIX, fig. 71) with the pleurites very short and stout, the inner dorsal angle produced caudad into a blunt fleshy lobe whose inner margin is fringed with numerous long hairs; a short blunt, fleshy knob (*k*) at the base of this lobe, provided with five long hairs on the margin; first pleural appendage (*i*) slender, originating just below the knob (*k*), directed proximad, the base enlarged with two or three stout hairs, the tip slightly bifid, the caudal arm with two bristles, the cephalic arm with one bristle; a stout bristle just before the tip on the inner or cephalic side; second pleural appendage (*2*) a powerful, chitinized hook, slightly curved, directed proximad, bent strongly cephalad toward the apex; third

appendage (*3*) a slender, fleshy rod, beyond the slightly enlarged base bent strongly dorsad so that it lies above the second appendage, directed caudad at the tip which is capped by a short, blunt, chitinized spine. Ninth tergite short, broad, the caudal margin transverse. Ninth sternite with a prominent median knob on the caudal margin, provided with numerous setigerous tubercles.

Gonomyia (Gonomyia) cognatella Osten Sacken.

Gonomyia cognatella Osten Sacken; Proceedings of The Academy of Natural Sciences of Philadelphia, p. 230 (1859).

A more southern species than the last, their ranges overlapping in New York State:

Connecticut, New Haven County, East River, July 6, 1910 (Ely).

New York, Fulton County, Sport Island, Sacandaga River, June 18, 1911, to August 26, 1916 (Alexander); Herkimer County, Indian Castle, June 10 to 13, 1915 (Alexander).

Maryland, Montgomery County, Cabin John Bridge, May 16, 1909 (Knab); Plummers Island, May 24, 1914 (McAtee).

District of Columbia, Washington (Osten Sacken); the type-locality.

Virginia, Fairfax County, Difficult Run, July 25, 1915 (McAtee and Alexander).

North Carolina, Buncombe County, Black Mountains, July 16, 1912 (Beutenmuller).

The wing is shown on Plate XXVI, fig. 29.

The male hypopygium (Plate XXIX, figs. 73–75) with the pleurites very short and stout, the inner dorsal angle produced caudad as a slender, finger-like lobe, fimbriate with eight or nine long stout hairs on the dorsal inner edge; at the base of the lobe a small, slender, cylindrical knob (*k*) with three long hairs at the apex; ventrad of this finger-like angle of the pleurite is an elongate, very slender, pale appendage (*2*) directed caudad and slightly ventrad and proximad, at the apex with two long slender hairs; pleural appendage (*3*) directed ventrad on its basal portion, soon bent directly upon itself, dorsad, the tip caudad; the appendage is pale, chitinized, slender, bifid, the lateral arm with the apex somewhat twisted, the proximal arm a slender, pale stylet directed strongly proximad, at the apex with an elongate, slender, black, chitinized spine. Proximad of the base of the knob (*k*) is a slender appendage with a prominent hair at the apex and two slightly smaller subterminal hairs.

The Galactoptera Group.

Gonomyia (Gonomyia) galactoptera Bergroth.

Gonomyia galactoptera Bergroth; Wiener Entomologische Zeitung, vol. 7, p. 196 (1888).

This fly is still known only from the type-locality, Sitka, Alaska. It is the only New World species of this genus that I have not seen.

The Noveboracensis Group.

Gonomyia (Gonomyia) noveboracensis Alexander.

Gonomyia noveboracensis Alexander; Canadian Entomologist, vol. 48, pp. 319, 320 (1916).

A fly of local distribution in the northeastern United States:

New York, Fulton County, Sport Island, Sacandaga River, June 11, 1914 (Alexander), the type-locality.

The wing is shown on Plate XXVI, fig. 30.

The male hypopygium (Plate XXX, figs. 79, 80) with the pleurites prominent, elongate, with the dorsal inner edge with a prominent tubercle bearing several hairs, ventral inner edge with a row of large setigerous tubercles; pleurites bearing three small appendages, a small inner dorsal cylindrical appendage (*a*) directed cephalad, slightly enlarged basally, at the apex bearing three or four prominent hairs; a dorsal apical appendage (*b*) directed proximad, flattened, enlarged at the apex which bears a row of delicate hairs; a slender, subchitinized ventral apical appendage (*c*) directed proximad, slightly toothed at the tip and on the lower side just before the tip. Gonapophyses and the penis-guard (Plate XXX, fig. 80) fused into a very large, prominent, cylindrical tube armed with chitinized horns and fleshy lobes; dorsal surface of the tube with two subpendulous fleshy lobes, approximated on the median line, densely provided with short, pale hairs; horns of the cylinder directed caudad and slightly ventrad; outermost horns (*a*) very broad at the base, tapering to the acute apex which is curved proximad; the next inner pair (*b*) slender, chitinized, bifid at the apex; innermost pair (*c*) longest, slender, slightly twisted, narrowed toward the apex. Ninth tergite with a broad, rounded median concavity. Ninth sternite with a broad V-shaped median notch, the adjacent angles produced caudo-laterad as fleshy lobes provided with numerous setigerous punctures.

The Subcinerea Group.

Gonomyia (Gonomyia) filicauda Alexander.

Gonomyia filicauda Alexander; Canadian Entomologist, vol. 48, pp. 320, 321 (1916).

Still known only from the type-locality, Webster, near Platte Cañon, Colorado, altitude 9,500 feet, August 24 to 26, 1915 (Oslar),

and the base of Haden Peak, Colorado, altitude 12,000 feet, August 10, 1915 (Oslar).

The wing is shown on Plate XXVI, fig. 31.

The male hypopygium (Plate XXV, figs. 81, 82) with the pleurites moderately elongated, the dorsal angle produced caudad and slightly dorsad as an elongated fleshy lobe that is sparsely hairy, the hairs on the dorsal face strong, those on the inner face weak; ventral pleural appendage (*v*) very long, slender, beyond the base slightly expanded, the apical portion slender, slightly expanded toward the tip, dusky in color and provided with an abundance of long, delicate hairs; dorsal pleural appendage (*d*) a short, fleshy lobe whose caudal margin is produced into a powerful, curved, heavily chitinized hook, directed inward and dorsad; at the tip of the fleshy portion of the lobe are two stout hairs and a group of about eight smaller ones. Penis-guard pale in color, simple, slender, from an enlarged base, the apex split by a deep rounded notch.

Gonomyia (Gonomyia) subcinerea Osten Sacken.

Gonomyia subcinerea Osten Sacken; Proceedings of The Academy of Natural Sciences of Philadelphia, p. 231 (1859).

This is apparently the commonest and most widely distributed species of the genus. It seems to be dimorphic or else there are two very closely allied forms that often occur together, one of which is sulphur-yellow and brown as described for this species, the other much more grayish and more restricted in its distribution than the typical form.

Ontario, Kearney, July 27, 28, 1911 (M. C. Van Duzee); Ottawa, August 13, 1912.

Quebec, Gatineau, July (Beaulieu); Aylmer, June (Beaulne).

Maine, Aroostook County, Fort Kent, August 28, 1913 (Osborn); Piscataquis County, Mt. Katahdin, August 22, 1913 (Alexander); Penobscot County, Orono, June 8 to September 7, 1913 (Alexander); Hancock County, Ellsworth, July 10 to August 16, 1913 (Stanwood).

Vermont, Windham County, Brattleboro, July 15, 1908 (Johnson).

Massachusetts, Middlesex County, Riverside, August 9 (Johnson); Auburndale, August 16 (Johnson).

Connecticut, Middlesex County, Middletown, June 16, 1909 (Johnson); New Haven County, East River, July 3, 1910 (Ely).

New York, Fulton County, Sacandaga Park, June 1, 1914 (Alexander); Gloversville, June 3, 1914 (Alexander); Herkimer County, Trenton Falls (Osten Sacken), the type-locality; Indian Castle, June 9 to 13, 1915 (Alexander); Onondaga County, Green

Lake, June 8, 1915 (Alexander); Tompkins County, Ithaca, May 13 to August 7, 1910; Albany County, Albany, June 26, 1912 (Young); Helderberg Mountains, June 12, 1915 (Alexander); Rockland County, West Nyack, June 15, 1912 (W. Sheffield); Westchester County, Tarrytown, June 9, 1914 (Frost).

New Jersey, Bergen County, Ridgewood, July, 1911 (Leonard); Mercer County, Princeton, June 18, 1915 (Alexander).

Maryland, Montgomery County, Forest Glen, July 6, 1914 (McAtee); Plummers Island, May 26, 1914 (Shannon).

District of Columbia, Washington (Osten Sacken); the type-locality.

Virginia, Alexandria County, Rosslyn, May 11, 1913 (Knab); Fairfax County, Four-mile Run, July 13, 1912 (Knab).

North Carolina, Buncombe County, Black Mountains, June 13, 1912 (Beutenmuller); Jones County, Pollocksville, July 8, 1915 (Alexander).

Michigan, Walnut Lake, June 26–28, 1907 (Needham).

Saskatchewan, Farewell Creek, September (Mrs. V. A. Anthony).

Missouri, St. Louis County, West St. Louis, May 12, 1914 (W. V. Warner).

Kansas, Pottawatomie County, Onaga (Crevecœur).

Montana, Beaver Creek, altitude 6,300 feet; August, 1913 (Hunter).

The wing is shown on Plate XXVI, fig. 33.

The male hypopygium (Plate XXVI, figs. 83–85) with the ninth pleurite elongate, rather slender, the dorso-lateral angle produced caudad in a slender, fleshy lobe that is provided with numerous long hairs; ventral pleural appendage (*v*) a long, slender, pale brown lobe that is almost straight, slightly expanded toward the blunt apex, provided with numerous setigerous punctures; dorsal pleural appendage (*d*) two-lobed, the caudal lobe a powerful, heavily chitinized, curved spine that is directed cephalad at its tip, provided with two or three small, acute denticles before the apex; the ventral arm is again bifid, the caudal portion a sharp, chitinized, feebly curved spine, the cephalic portion a small, subfleshy lobe with several hairs and short spines. Penis-guard very elongate, pale, narrowed at the apex, at the base on either side with a subtending, slender, subchitinized rod that is more or less flexible.

Gonomyia obscura Doane[8] is unrecognizable; the type in the National Museum is a broken female that is close to *subcinerea*, although its

[8] Journal of the New York Entomological Society, vol. 8, p. 192, Pl. 8, fig. 7 (1900), described as a *Phyllolabis*.

type-location (Pullman, Whitman County, Washington, June 22, 1898) is outside of the range of that species as now known.

Gonomyia (Gonomyia) æqualis Alexander.

Gonomyia æqualis Alexander; Canadian Entomologist, vol. 48, pp. 323, 324 (1916).

An extra-limital species (Guatemala, Central America) whose hypopygium has never been figured.

Male hypopygium (Plate XXX, fig. 86) with the pleurites moderately stout, the dorsal angle produced caudad as a very slender, finger-like lobe that is provided with numerous setigerous tubercles; at the base of this lobe on the inner side is a tiny fleshy protuberance directed proximad; ventral pleural appendage (*v*) a pale fleshy lobe densely covered with short, pale hairs; dorsal pleural appendage (*d*) irregular, fleshy, directed proximad, the caudal or outer face near the apex with a strong, curved, chitinized hook that is directed dorsad and cephalad, the cephalic or inner face with a row of strong bristles, at the tip longer and more approximated. Ninth tergite almost straight across or slightly concave. Penis-guard rather long, compressed, the median appendage pale, slightly curved. Anal tube (*a.t.*) broad, prominent, subtended on either side by a concave wing bearing on the caudal outer angle a fimbriate tuft of yellow bristles.

Gonomyia (Gonomyia) virgata Doane.

Gonomyia virgata Doane; Journal of the New York Entomological Society, vol. 8, p. 189, Pl. 7, fig. 21 (1900).

A western species with the following rather restricted range:

Washington, Pacific County, Tokeland (Doane), the type-locality.

California, Humboldt County, Eureka, June 6, 1903 (H. S. Barber).

The wing is shown on Plate XXVI, fig. 32.

The male hypopygium (Plate XXX, fig. 87) with the ninth pleurites rather elongate, the dorsal inner angle produced caudad as a slender, cylindrical, fleshy lobe that bears numerous long pale hairs; ventral pleural appendage (*v*) prominent, directed caudad, narrowed at the base, the apex a slight chitinized tooth directed proximad; second pleural appendage (*2*) a flattened or concave lobe, heavily chitinized at the apex which is broad, split into two acute teeth, of which the proximal one is the larger; dorsal pleural appendage (*d*) small, fleshy, bent slightly cephalad at the tip which bears two elongate bristles; cephalic or inner face of the appendage bearing numerous setigerous tubercles. Ninth tergite large, the caudal margin feebly convex, bearing a short, pointed tooth just inside the base of the pleurite.

Ninth sternite almost straight across, or slightly narrowed to the truncated apex.

Gonomyia (Gonomyia) unicolor Alexander.

Gonomyia unicolor Alexander; Proceedings of the United States National Museum, vol. 44, p. 507, Pl. 66, fig. 15 (1913).

An extra-limital species (Guatemala, Central America) included here to complete the data.

The male hypopygium (Plate XXX, fig. 89) with the pleurites moderately stout and elongated, the dorsal angle not produced; ventral pleural appendage (*v*) a double lobe, dark colored, subchitinized, the inner arm stout-cylindrical with the tip acute and the inner side with two or three hairs; the outer and more ventral arm slender, curved and bearing near the tip two stout divergent hairs; dorsal pleural appendage (*d*) a subcylindrical fleshy lobe from an enlarged base, at the apex with two powerful bristles; cephalic or inner face with four small hairs that are evenly spaced. Ninth tergite almost straight across or slightly concave. Penis-guard (Plate XXX, fig. 88) seen from beneath, a powerful, quadrangular chitinized base whose caudal angle is a ventrally directed hook, the base subtended on either side by short gonapophyses (*g*) that end in a sharp, conical spine; from above and dorsad of the quadrangular base arise two cylindrical, pointed, chitinized arms that are divergent.

Gonomyia (Gonomyia) mexicana Alexander.

Gonomyia mexicana Alexander; Canadian Entomologist, vol. 48, pp. 321, 322 (1916).

An extra-limital species described from Cordoba, State of Vera Cruz, Mexico, May 8, 1908 (Knab).

The male hypopygium (Plate XXX, fig. 91) with the pleurites elongate, though rather stout; ventral pleural appendage (*v*) a long, pale lobe, subcylindrical, blunt at the apex and bearing sparse, elongate hairs; second pleural appendage strongly chitinized, the tip acute, curved; dorsal pleural appendage (*d*) rather short, cylindrical, fleshy, the cephalic or inner angle of the apex with two powerful bristles; caudal or outer angle of the apex with two smaller hairs. Ninth tergite rather short, the caudal margin straight or nearly so. Penis-guard (Plate XXX, fig. 90) very long and pale, the apex bifid by a deep U-shaped notch, each lobe provided with long hairs; on the ventral face arises a slender, rod-like, median appendage, sparsely short-hairy at the apex and down the ventral face; the divergent subtending arms are slender, somewhat flattened, the apex produced

into a slender cylindrical point, the outer or ventral margin with a few sharp, appressed teeth.

RHABDOMASTIX Skuse.

Rhabdomastix Skuse; Proceedings of the Linnæan Society of New South Wales, series 2, vol. 4, pp. 828, 829 (1889).

Subgenus SACANDAGA Alexander.

Rhabdomastix (Sacandaga) monticola sp. n.

Coloration grayish black; wings whitish hyaline with an indistinct pale brown stigma; cross-vein *r* present but faint; cell R_2 small; cell *1st* M_2 elongate with the basal deflection of Cu_1 inserted at about mid-length.

Male.—Length about 5.5 mm.; wing, 6 mm.

Rostrum and palpi dark brownish black. Antennæ black, the flagellar segments with a long, pale pubescence; flagellar segments narrowed, especially terminally. Head black with a sparse grayish bloom.

Mesonotum black with a sparse grayish yellow pollen; tuberculate pits on the extreme cephalic margin of the sclerite. Pleura clearer gray. Halteres pale, the knobs enlarged, the stem a little darkened basally. Legs with the coxæ black with a sparse gray bloom; trochanters brown; femora dark brown; tibiæ yellowish brown, a little darkened at the base and more narrowly at the tips; tarsal segment one and all except the tip of two yellowish brown; remainder of the tarsi dark brown. Wings subhyaline, the stigma fairly distinct, oval, pale brown; veins dark brown, *Sc* paler. Venation (Plate XXVII, fig. 41) with *Rs* elongate; cell R_2 small, vein R_2 being short, oblique; R_3 arcuated; cross-vein *r* present but very indistinct, bisecting the stigma; cell *1st* M_2 rectangular, somewhat elongated, the veins issuing from it not elongated, divergent; basal deflection of Cu_1 almost mid-length of cell *1st* M_2.

Abdomen dark brownish black.

Habitat.—Western America.

Holotype, ♂, Kokanee Mountain, British Columbia, altitude 8,000 feet, August 11, 1903 (R. P. Currie).

Paratopotypes, 3 ♂'s.

Type in the collection of the United States National Museum.

This species was formerly determined as being *R.* (*S.*) *caudata* Lundbeck[9] in the first part of this series, but additional material

[9] Diptera gröenlandica, Vidensk. Meddel. fra den naturh. Foren., p. 267, Pl. 6, fig. 18 (1898); as a *Goniomyia*, subgenus *Empeda*.

shows that the species is distinct. It serves to connect the generalized *caudata* with the specialized members of the subgenus (*flava*, *parva*). The small cell R_2 and the elongate cell *1st* M_2 with the short, divergent veins issuing from it, and the basal deflection of Cu_1 inserted at nearly midlength of it serve to separate the form from *caudata*. This latter species is described and figured in a publication that is not readily accessible to the student, and its venation is shown on Plate XXVII, fig. 42. With *caudata* this new species agrees in the possession of the radial cross-vein, but this is here very faint and evidently in process of being eliminated. In *R. flava* (Plate XXVII, fig. 43) the cross-vein is lacking.

In regard to the genus *Rhabdomastix* Skuse it will be noted that Kertesz gives the date of Skuse's paper on the Limnobinæ as 1890; the first separates of this article are dated September 25, 1889, and it is this date that has been adopted.

PTEROCHIONEA gen. n.

Palpi short, four-segmented, the segments subequal. Antennæ 11-segmented, the first segment of the scape longer than the second; second segment narrow-subglobular, not strikingly wider than the adjacent segments; first segment of the flagellum elongate, tapering slightly to the tip, formed by the fusion of five segments as determined by the verticils, near the tip with a faint suture that passes about half-way across the segment on the verticillate side; segments four to ten moderately elongated, cylindrical, truncated at both ends (Plate XXXI, fig. 93) with a strong series of verticils; terminal segment formed by the fusion of two segments as determined by the verticils. Wings moderately broad (Plate XXVII, fig. 44); *Sc* moderately elongated ending just beyond the end of *Rs*, Sc_2 at its tip; *Rs* long, strongly arcuated at its origin; cross-vein *r* present; cell *1st* M_2 elongate, the deflection of M_3 over twice the length of the median cross-vein; cell M_1 present; basal deflection of Cu_1 at the fork of *M*; second anal vein short, ending before the origin of the sector. Legs hairy, not incrassated; tibiæ without spurs. Male hypopygium powerful (Plate XXXI, fig. 94), suggesting the *Chionea* type, the pleural pieces stout, cylindrical, with a strong pleural appendage, somewhat curved, nearly as long as the pleurites; ventral lobe small, rounded, hairy.

Genotype.—Pterochionea bradleyi sp. n. (Western Nearctic region.)

This new genus is closest to *Crypteria* Bergroth[10] of the northern Palæarctic region in the curious fusion of the five basal segments of

[10] *Acta Soc. pro Faun. et Flor. Fenn.*, vol. 37, No. 6, pp. 3–7, figs. 1–4 (1913).

the antennæ; however, this fusion-segment is merely elongated and does not show the elongate-conical shape of the segment in *Crypteria* and the even more accentuated condition of *Chionea*. Specimens of *Chionea valga* Harris before me show eight flagellar segments beyond the fusion-segment, the basal ones short, becoming more and more attenuated toward the tip of the organ. Therefore, in the reduction of the antennal segments by the fusion of the basal flagellar segments, *Chionea* also shows a very close relationship to *Crypteria* and *Pterochionea*. I certainly think that Bergroth is right in surmising a relationship between his *Crypteria* and the abnormal, wingless *Chionea*, and *Pterochionea* may now be added to the list of possible *Chionea*-precursors. This interpretation would remove *Chionea* from the neighborhood of *Trimicra* and *Symplecta* and place it at the end of the Eriopterine series along with *Cladura* and the present genus.

The two winged genera of this group may be separated as follows:

1. Antennæ with the second segment enlarged, globular; the two apical segments of the flagellum entirely distinct; cross-vein *r* absent; second anal vein very elongate, extending beyond midlength of the radial sector; hypopygium with the pleural pieces slender with two small, subequal appendages. (Northwestern Palæarctic.).....*Crypteria* Bergroth.

   Antennæ with the second segment not enlarged; the two apical segments of the flagellum fused; cross-vein *r* present; second anal vein short, not reaching to the base of the sector; hypopygium with the pleural pieces stout-cylindrical with a strong, powerful dorsal appendage that is almost as long as the pleurite. (Northwestern Nearctic.).....*Pterochionea* gen. n.

Pterochionea bradleyi sp. n.

Antennæ brown, of eleven segments; wings with cell M_1 present; male hypopygium strong and powerful.

Male.—Length, 5 mm.; wing, 5.6 mm. Fore leg, femur, 3.6 mm.; tibia, 3.8 mm.; hind leg, femur, 4.1 mm.; tibia, 4 mm.

The species is described from alcoholic material.

Rostrum short, light brown; palpi brown. Antennæ dark brown; Head yellowish brown.

Thoracic dorsum dull yellow with indistinct darker stripes on the præscutum. Pleura yellowish. Halteres pale. Legs with the coxæ and trochanters pale yellow; femora light brownish yellow, a little darkened apically, the fore femora darker, being only a little paler at the base; tibiæ and tarsi brown. Wings nearly hyaline, the stigma indistinct; veins dark brown, subcosta pale. Venation (Plate

XXVII, fig. 44): basal deflection of R_{4+5} very short or obliterated, the cross-vein *r-m* being correspondingly longer, arcuated; cell M_1 short, about one-half as long as its petiole.

Abdomen short, the tergites dark brown, the hypopygium even darker. Male hypopygium (Plate XXXI, fig. 94) powerfully enlarged, the pleurites not conspicuously elongated ending in a rounded ventral lobe that is covered with numerous hairs; the single pleural appendage a powerful curved arm that is rather blunt at the tip, with numerous long hairs on the inner face and at the apex where they are exceedingly numerous and spinous, at the extreme apex very tiny.

Habitat.—British Columbia.

Holotype, ♂, Rogers Pass, British Columbia, August 9, 1915 (Bradley).

Allotype, ♀, in copula with the type.

Type, mounted in balsam, in the collection of Cornell University.

This interesting crane-fly is dedicated to the collector, Dr. J. Chester Bradley, of Cornell University, to whom I am indebted for assistance and advice upon many subjects.

Tribe **Limnophilini.**

LIMNOPHILA Macquart.

Limnophila Macquart; Suit a Buffon, vol. 1, Histoire Naturelle Dipteres, p. 94 (1834).

Limnophila irrorata Johnson.

Limnophila irrorata Johnson; Proceedings of the Boston Society of Natural History, vol. 34, No. 5, pp. 127, 128, Pl. 16, fig. 17 (1909).

This interesting species was described from the unique female found floating dead in a water receptacle at Riverton, New Jersey, and had apparently not been found since that time. The fly was rediscovered in 1915 while the author was searching for Venus fly-traps, *Dionœa muscipula* Ell., near Jacksonville, North Carolina. The male sex is here described and the specimen made the allotype:

Male.—Length 7.6–7.8 mm.; wing, 7–7.3 mm. Agrees closely with the female, but the head a little more brownish; petiole of cell R_2 of the wings very short, not as long as the *r-m* cross-vein; basal deflection of Cu_1 inserted beyond mid-length of cell *1st* M_2.

Allotype, ♂, Camp Perry, Onslow County, North Carolina, July 9, 1915 (Alexander).

Allotype in the collection of the author.

The following notes on the natural habitat of the species may be given:

At Camp Perry, Onslow County, North Carolina, July 9, 1915, on a small branch of the New River. The flies occurred in a typical sweet-gum swamp, the dominant forest cover being the *Liquidambar*, *Ilex opaca*, *Quercus michauxi*, *Acer rubrum*, *Fraxinus* sp., with considerable *Liriodendron* and a little *Pinus tæda*, growing in very wet to moist soil, and the undergrowth was very rank and luxuriant, consisting of the all-dominant lizards-tail, *Saururus cernuus*, from which plant the flies were swept; other plants, as *Osmunda regalis*, *Onoclea sensibilis*, *Carpinus caroliniana* and *Callicarpa americana*, being common. The following crane-flies were associated with this species:

Gonomyia sulphurella, rare; *G. manca*, common; *Gnophomyia tristissima*, uncommon; *Epiphragma solatrix*, rare; *Limnophila macrocera*, uncommon; *L. tenuipes* and *luteipennis* abundant; *Penthoptera albitarsis*, common; *Brachypremna dispellens*, abundant, many being heavily infested with a species of *Trombidium*; *Oropeza subalbipes*, rare; *Tipula tricolor*, common; *T. perlongipes*, rare; *Bittacomorpha clavipes* and *Ptychoptera rufocincta*, common.

It should be here noted that there is a *Polymoria irrorata* Philippi[11] that in all probability is a *Limnophila* and prior to the present species. This apparent status of *Polymoria* has been pointed out by the author in another paper.[12]

Limnophila strepens sp. n.

Head light gray with short, brown hairs; thorax yellowish brown with a darker median stripe on the præscutum; legs brownish-yellow, the femora and tibiæ not darkened at their apices.

Male.—Length, about 12 mm.; wing, 11.8 mm.

Rostrum and palpi dark brown. Antennæ short, light brown, the flagellar segments gradually narrowed and lengthened toward the tip of the organ; verticils long, black. Head light gray with numerous, rather short brown hairs, inserted in blackish punctures.

Mesonotum light yellowish brown with a broad darker reddish brown median stripe; lateral stripes indistinct; lobes of the scutum reddish brown, their posterior margin and the scutellum more yellowish; postnotum pale reddish with a sparse gray bloom. Pleura reddish brown with a sparse gray bloom. Halteres pale, the knobs darker at their tips. Legs with the coxæ reddish yellow; trochanters dull yellow; femora and tibiæ brownish yellow throughout; tarsi

[11] *Verh. zool.-bot. Ges. Wien.* vol. 15, p. 608, Pl. 23, fig. 3 (1865).
[12] *Proc. U. S. National Museum*, vol. 44, pp. 481, 490 and 547 (1913).

brown. Wings subhyaline, costal region more yellowish; apex of the wing broadly but indistinctly darkened; stigma prominent, dark brown; a pale brown seam on the deflection of R_{4+5}. Venation: *Rs* moderate in length, somewhat angulated at its origin; R_{2+3} about equal to or a little shorter than that portion of R_2 before the radial cross-vein; *r* at the tip of R_1; basal deflection of Cu_1 under the middle of cell *1st* M_2.

Abdominal tergites dull yellow, unmarked; sternites a little lighter yellow, the eighth segment and the caudal portions of the seventh a little more brownish.

Habitat.—Western United States.

Holotype, ♂, Marin County, California (Coll. Hy. Edwards, No. 814).

Type in the collection of the American Museum of Natural History.

Related to *flavipila* Doane which has the hairs on the head longer and light yellow in color, the mesonotum darker brown, the pleura light gray, the tips of the femora and tibiæ dark brown, wings with a more yellowish tinge, especially near the costa, R_{2+3} much shorter than that portion of R_2 before the radial cross-vein. In *flavipila* the head and first antennal segment are light gray, not brown as described by Doane.

Limnophila edwardi sp. n.

Antennæ elongated; cell M_1 of the wings absent; thorax with dark stripes on the præscutum.

Male.—Length, 7.2 mm.; wing, 8 mm.; antennæ about 5 mm.

Rostrum dull yellow, the palpi brownish black. Antennæ dark brown, the flagellar segments greatly elongated with outspreading pubescence. Head dark brownish black with a sparse grayish bloom.

Thorax brownish yellow, the præscutum with three broad, dark brown stripes, the middle one broadest, confluent behind with the short lateral stripes; scutum, scutellum and postnotum dark brown. Pleura brownish yellow. Halteres pale, the knobs darker, brown. Legs with the coxæ, trochanters and bases of the femora dull yellow; remainder of the legs dark brown. Wings with a faint brownish tinge; stigma elongate-oval, dark brown; veins dark brown. Venation (Plate XXVII, fig. 45): *Rs* elongate, in a line with R_{2+3}; R_{2+3} longer than the basal deflection of Cu_1; cross-vein *r* at the fork of R_{2+3}; cell M_1 lacking.

Abdomen dark brown, the hypopygium more yellowish.

Habitat.—Northeastern United States.

Holotype, ♂, Simmons Woods, Gloversville, Fulton County, New York, altitude 900 feet, June 22, 1916 (Alexander).

This is the first Eastern species that has the antennæ elongated and cell M_1 of the wings lacking at the same time. It bears a great resemblance to *L. tenuipes* Say, a species with cell M_1 present and the venational details slightly different.

The type was taken in a cold woods with decided Canadian floral tendencies, in association with the following Tipulidæ:

Dicranomyia pubipennis, Ormosia monticola, O. rubella, Erioptera stigmatica, Gonomyia florens, Limnophila toxoneura, L. areolata, L. alleni, L. fuscovaria, L. munda, Adelphomyia minuta, Ula elegans, Rhaphidolabis rubescens, Tricyphona calcar, Tipula oropezoides, T. hermannia and *T. monticola.*

I dedicate this species to Thomas Edward, the eminent Scotch naturalist, the story of whose life and struggles[13] in the interests of natural science has always done much to encourage me in this work.

Limnophila sylvia sp. n.

Antennæ short; cell M_1 of the wings absent; thorax with dark stripes on the præscutum; pleura without stripes.

Male.—Length, 5–5.5 mm.; wing, 6.5–7.6 mm.

Rostrum brownish yellow, the palpi dark brown. Antennæ short, the scapal segments dull yellow, flagellum dark brown; flagellar segments oval. Head brown with a sparse grayish bloom.

Thorax dull light yellow, the præscutum with three dark brown stripes, the lateral stripes confluent with the median stripe; scutum yellow with the lobes largely dark brown; scutellum yellow; postnotum brownish yellow. Pleura yellow. Halteres pale, the knobs brownish. Legs with the coxæ and trochanters dull yellow; femora dull yellow, the tips darker brown; tibiæ yellowish brown, tipped with brownish; metatarsi brownish yellow, the remainder of the tarsi dark brown. Wings with a slight grayish tinge; stigma rather indistinct, brownish; veins dark brown. Venation (Plate XXVII, fig. 46): R_{2+3} rather elongated, about equal to the basal deflection of Cu_1; cross-vein *r* at the tip of R_1 and situated on R_2; deflection of R_{4+5} arcuated, nearer the wing-root than is the *r-m* cross-vein; cell M_1 absent; basal deflection of Cu_1 variable in position, at the fork of M, just beyond the fork of M to about one-third the length of the cell *1st* M_2.

Abdominal tergites dark brown; sternites dull brownish yellow,

[13] Life of a Scotch Naturalist: Thomas Edward, associate of the Linnæan Society, by Samuel Smiles (Harper & Bros., 1877).

the caudal margins a little brighter; eighth and ninth sternites dark brown.

Habitat.—Northeastern United States.

Holotype, ♂, Mountain Lake, Fulton County, New York, altitude 1,600 feet, June 13, 1916 (Alexander).

Paratopotypes, 2 ♂'s.

Type in the collection of the author.

This species was associated with *Erioptera nyctops,* and an account of the ecological conditions and associates will be found under the account of that species.

L. sylvia is quite distinct from any of the described species that lack cell M_1 of the wings. From the *quadrata* group it differs in having vein R_2 long, not tending to be oblique, deflection of R_{4+5} nearer the wing-root than is *r-m,* basal deflection of Cu_1 nearer to the base of cell *1st* M_2, etc.; from the *lenta* group it differs in the long sector; from *emmelina,* it differs in the petiolate cell R_2, and from *noveboracensis* it differs in having *Rs* almost in a line with R_{2+3}, the dark brown stripes on the præscutum, etc.

POLYMERA Wiedemann.

Polymera Wiedemann; Diptera exotica, vol. 1, p. 40 (1821).

Polymera georgiæ Alexander.

Polymera georgiæ Alexander; Psyche, vol. 18, pp. 199, 200, Pl. 16, fig. 5 (1911).

This is the only known species of the genus as yet found within our limits and, so far as known, it is confined to the southeastern United States. *P. obscura* Macquart, of northern South America and Middle America, ranges into Cuba and may appear in the Miami section of Florida. *P. geniculata* Alexander of Porto Rico is also regional. The distribution of *Polymera georgiæ* is as follows:

South Carolina, Georgetown County, South Island, August 19, 1915 (Alexander).

Georgia, Decatur County, Spring Creek, July 20, 1912 (Bradley); Glynn County, St. Simons Island, April, May, 1911 (Bradley), the type-locality; Charlton County, Billy's Island, Okefinokee Swamp, June 20, 1912 (Bradley).

Florida, Dade County, Biscayne Bay (Slosson).

The only specimen that I have ever seen alive was taken in a salt-marsh palmetto association on South Island, South Carolina, at the east end of the causeway between South and Cat Islands. The association was a palmetto island surrounded on the west by a perfect sea of the salt rush (*Juncus Roemerianus*). The forest cover con-

sisted of the dominant palmetto (*Sabal Palmetto* (Walt) R. & S.), live oak, *Quercus virginiana*, heavily draped with spanish moss, *Tillandsia*, and the coast white cedar, *Chamæcyparis thuyoides*. The shrubbery consisted of a mixed growth of *Myrica carolinensis*, common; *Ilex vomitoria*, several; *Callicarpa americana*, abundant, and two shrubby Composites, *Iva frutescens* and *Borrichia frutescens*, common. The undergrowth from which the Tipulids were swept consisted of great beds of *Polygonum punctatum*, with a more sparse admixture of spike grass, *Distichlis spicata; Hydrocotyle umbellata;* and the Verbenaceous plants, *Lippia nodiflora* and *Verbena caroliniana*.[14]

The Tipulidæ of the above floral association showed a strong Floridian tendency, the associates of *Polymera* being as follows:

Dicranomyia distans, abundant; *D. floridana*, rare; *Teucholabis carolinensis*, rare; *Gonomyia* (*Leiponeura*) *puer*, rare; *G.* (*Gonomyella*) *slossonæ*, several; *Erioptera* (*Mesocyphona*) *parva*, abundant, and *Brachypremna dispellens*, common.

Tribe Pedicini.

TRICYPHONA Zetterstedt.

1838. *Tricyphona* Zetterstedt; Insecta Lapponica, Dittera, p. 851.

This genus, like the tribe *Pedicini* in general, has a northern distribution throughout the world. There are seven species now known in the eastern United States which may be summarized as follows:

Tricyphona inconstans Osten Sacken. (Plate XXVIII, fig. 47.)

Canadian and Transitional-Canadian zones of the eastern United States and Canada. One of our commonest and best-known crane-flies, ranging from Ontario, Quebec and Newfoundland south (in the mountains) to Georgia and west to Michigan. It is also recorded from Europe, but a very careful comparison with abundant material and a critical study of the male hypopygium must be made before these records can be finally accepted. The fly is abundant in swamps and low swales. In New York and New England it is on the wing from May 12 to September 28, while in the vicinity of Washington it appears even earlier (Great Falls, Virginia, April 20, 1913 (Knab)).

Tricyphona calcar Osten Sacken. (Plate XXVIII, fig. 48.)

Canadian life-zone of northeastern America, ranging from the Hudsons Bay region, Ontario and Quebec south (in the mountains)

[14] I am indebted to Mr. W. L. McAtee, of the United States Biological Survey, for his kindness in determining many of the above-listed plants.

to North Carolina. It is a species of low swampy areas, though usually more wooded than that frequented by *inconstans*. In New York and New England it flies from May 22 to October 1, being abundant in late May and early June, reappearing the latter half of July and being common throughout August and early September. The late summer specimens probably represent a new species, the females having the wings very reduced in size.

Tricyphona auripennis Osten Sacken. (Plate XXVIII, fig. 49.)

Canadian life-zone of the northeastern United States, known only from New Hampshire, Massachusetts (the type-locality) and New York. It flies in June. The only specimens ever seen alive by the author occurred at Indian Castle, Herkimer County, New York, June 10 to 13, 1915; they were found sitting motionless on the perpendicular face of a small cliff, lurking in small crevices of the rock. The cliff is low, of Utica shale, completely saturated by percolating water and well-shaded by large hemlocks, arbor vitæ, yellow birch, mountain maple, *Cornus circinata*, etc., and with a sparse vegetation of *Impatiens biflora*, *Geranium Robertianum*, *Collinsonia canadensis*, *Cystopteris bulbifera* and *Equisetum arvense*.

Tricyphona hyperborea Osten Sacken. (Plate XXVIII, fig. 50.)

A fly of the Hudsonian and possibly the Canadian life-zones of northeastern America and still very rare in collections. It was described from Labrador, and a few specimens have been taken on Mt. Washington, New Hampshire; these specimens are in the collections of the Boston Society of Natural History and the United States National Museum.

Tricyphona katahdin Alexander. (Plate XXVIII, fig. 51.)

Canadian life-zone of the northeastern United States, a late summer species flying during the latter half of August.

Tricyphona vernalis Osten Sacken. (Plate XXVIII, fig. 52.)

Canadian and Canadian-Transitional zones of the northeastern United States. One of our early-flying species, though appearing later, as a rule, than *paludicola*. It ranges from Maine and New Hampshire south (in the mountains) to Georgia, and is found along small streams, temporary and permanent, where the water runs rapidly. The flies may be swept from vegetation or are found in small swarms of eight to ten individuals near the water. In New York and New England it is on the wing in late May, abundant in June and persisting into July. Further south it flies in April or even the last of March, reappearing in late September.

Tricyphona paludicola sp. n. (Plate XXVIII, fig. 53.)

Canadian-Transitional life-zone of the northeastern United States, as yet known only from New York. It flies in early spring (May 7–20), and is found in swampy, stagnant localities.

Tricyphona paludicola sp. n.

Antennæ dark brown throughout; head and thorax grayish brown, the mesonotal præscutum with three dark brown stripes, the middle one split by a broad line of the ground-color; abdomen brown, the tergites uniform in color; wings almost unicolorous, the dark markings reduced to punctiform dots and narrow seams.

Male.—Length, 7.6–8 mm.; wing, 8.6–8.7 mm.

Female.—Length, 10.5–10.9 mm.; wing, 10.5–10.8 mm.

Rostrum and palpi dark brown. Antennæ black, the flagellar segments shortened and gradually narrowed. Head grayish brown.

Mesonotal præscutum pale grayish brown with three dark brown stripes, the middle stripe very broad and more or less bisected by a narrow, median vitta of the ground-color, lateral stripes short, narrow; scutum gray, the lobes with a rounded dark brown spot; scutellum and postnotum light gray. Pleura light gray, the dorsopleural membranes pale brown. Halteres light brown, the knobs dark brown. Legs with the coxæ reddish, gray pruinose; trochanters brownish yellow; femora dark brown, the fore pair with the basal quarter a little brightened, middle pair with the basal third, hind pair with about the basal half brightened; tibiæ and tarsi dark brown. Wings grayish subhyaline, the costal cells more suffused, brownish yellow; tiny dark brown dots at Sc_2, origin of *Rs*, tip of Sc_1, cross-vein *r*, above the fork of *Rs*, cross-vein *r-m* and a narrow seam along the basal deflection of Cu_1; paler gray clouds underneath the tip of R_{2+3} and near the tip of *2nd A*; veins dark brown, *Sc* more yellowish. Venation (Plate XXVIII, fig. 53): distance between Sc_2 and the origin of the sector about equal to the sector alone; *Rs* angulated and often spurred at origin; *r* at the tip of R_1; distance between the fork of *Rs* and cross-vein *r-m* about equal to that cross-vein; petiole of cell R_3 a little longer than *r-m*; cell *1st* M_2 closed, long and narrow; cell M_1 present, usually longer than its petiole; cross-vein *m-cu* present or barely obliterated by the fusion of the adjacent veins.

Abdominal tergites dark grayish brown; sternites similar with the basal segments indistinctly ringed with paler; hypopygium concolorous with the rest of the abdomen; valves of the ovipositor brownish yellow.

Habitat.—Northeastern United States.

Holotype, ♂, McLean, Tompkins County, New York, May 13, 1916 (Alexander).

Allotype, ♀, with the type.

Paratopotypes, 24 ♂'s, 1 ♀; 1 ♂, 1 ♀, on May 20, 1916 (P. A. Claassen).

The type is in the collection of the author; Mr. Claassen has deposited his paratypes in the collection of the University of Kansas.

As is very frequent in this genus of flies, abnormalities of the wing-venation often occur; one male specimen has cell *1st* M_2 open by the atrophy of the median cross-vein in both wings; four other males in the series show adventitious cross-veins or spurs in various cells of the wings.

When Osten Sacken described *Tricyphona vernalis*,[15] he had only a male and a female specimen from Washington, D. C., taken in April, these showing the pale antennal bases, cingulated abdomen and heavily patterned wings that are characteristic of *vernalis*. The specimens from the White Mountains, New Hampshire, were added in the Monographs, p. 271. I am greatly indebted to Mr. C. W. Johnson for his kindness in examining the types of *vernalis* and making notes upon them. Abundant material that I have determined as *vernalis* agree in all details with Osten Sacken's descriptions, except that the capillary median ground vitta on the præscutum is less distinct than the description implies.

The gray or brownish gray species of this section of *Tricyphona* may be separated by the following key:

1. Scape of the antennæ yellowish or brownish yellow, the flagellum much darker, dark brown; abdominal tergites brown, the margins of the segments pale producing a cingulated appearance; wings with large rounded clouds at the tips of the longitudinal veins and along the cross-veins..... *vernalis* Osten Sacken.

Scape of the antennæ dark brown, concolorous with the flagellum; abdominal tergites brown, unbanded; wings with the pattern almost obsolete, reduced to tiny dots and seams..... *paludicola*, sp. n.

The following ecological notes on *Tricyphona paludicola* are taken from my field notes, dated May 13, 1916, 10–11 A.M., at the McLean bogs where we were engaged in making a biological survey of the region under the personal direction of Dr. James G. Needham.

[15] Proceedings of The Academy of Natural Sciences of Philadelphia, pp. 291, 292, 1861, as *Amalopis*.

The species occurs in the *Alnus* association a short distance east of Round Pond, in company with *Tipula dejecta* Walker, the only other crane-fly on the wing at this date and hour.

The water is stagnant or nearly so with the little pools filled with an algal growth, kindly determined for me by Dr. J. R. Schramm, of Cornell University, as being near *Microspora* and *Tribonema*, abundant; *Œdegonium* sp. and *Spirogyra* sp., the latter conjugating laterally, and some *Mougeotia, Vaucheria,* etc., with many Diatoms; in addition to these there is a dense growth of young seedlings of *Impatiens biflora.* The mud is so soft that it is necessary to wade knee-deep in order to explore this region. There is still ice down underneath the stratum and the *Alnus* is just coming into leaf, allowing the sun to light up the ground underneath. The dominant herbaceous plants at this time were *Carex aquatilis, Saxifraga pennsylvanica,* with the plants in bud and the stalks not more than six to nine inches high, and *Caltha palustris* in full flower.

There is no doubt but that the *Tipula* and the present species both emerged from the stagnant pools formed in the marsh adjoining Grassy Creek. Both species of crane-flies were common, but the *Tipula* was more in evidence by its larger size and habit of flying. The *Tricyphona* was usually found resting on the saxifrage or on the inclined side of alder limbs, the males often fluttering about from place to place a short distance above the ground, never very rapidly. The females were found resting on the alder stems, inactive, and the males were presumably searching for them.

In the afternoon when the warmth of the sun made itself felt, none of the *Tricyphona* and only a few of the *Tipula* were in evidence in this haunt, their places having been taken by dense swarms of Chironomidæ and a very few of the crane-fly, *Erioptera septemtrionis* Osten Sacken.

On May 20, Mr. P. A. Claassen found a male and a female in his tent-traps set near this place, proving that the immature stages are spent in the mud beneath.

RHAPHIDOLABIS Osten Sacken.

Rhaphidolabis Osten Sacken; Monographs of the Diptera of North America, pt. 4, p. 284 (1869).

Subgenus RHAPHIDOLABINA subgen. n.

Similar to *Rhaphidolabis* s. s., differing as follows: Antennæ 15-segmented, the first eight segments of the flagellum normal, cylindrical, bearing strong hairs at about midlength, these alternating

in their arrangement, being on the same face on the even segments; the ninth and eleventh segments are smaller and lie between the long, verticillate tenth and twelfth segments; thirteenth segment of the flagellum long, sigmoid, bearing three long hairs at the apex. Wings with the median cross-vein present, connecting M_{1+2} with M_3.

Type of the subgenus, *Rhaphidolabis flaveola* Osten Sacken.

The curious pallid fly that I have deemed best to separate from the other species of the genus is anomalous in many respects and may eventually be placed nearer to *Tricyphona*, where indeed it was provisionally assigned by Needham.[16] It is certainly more distinct from *Rhaphidolabis* than is *Plectromyia* which has herein been considered to have subgeneric value. Under these circumstances it may be better to call the genus *Plectromyia*, that name having page-priority over *Rhaphidolabis*, but for the present the latter name has been retained.

The American species of the genus may be separated by the following key:

1. Antennæ 15-segmented; cross-vein *m* present (subgenus *Rhaphidolabina*). (Northeastern United States.) ..... *flaveola* Osten Sacken.
   Antennæ 13-segmented; cross-vein *m* absent 2
2. Cell M_1 absent (subgenus *Plectromyia*). (Northeastern United States.) ..... *modesta* Osten Sacken.
   Cell M_1 present (subgenus *Rhaphidolabis*) 3
3. Cell R_2 petiolate 4
   Cell R_2 sessile 6
4. Wings whitish hyaline with a dark brown, oval stigma. (Eastern Rocky Mountain region.) ..... *neomexicana* Alexander.
   Wings without a clearly defined, dark brown stigma 5
5. Antennæ of the male elongated; *Rs* long, straight, the distance between Sc_2 and the origin of the sector being less than the length of the sector. (Western United States.) ..... *polymeroides* Alexander.
   Antennæ of the male short; *Rs* short, arcuated, the distance between Sc_2 and the origin of the sector about two times the length of the sector. (Eastern United States.) ..... *tenuipes* Osten Sacken.
6. Coloration grayish brown, the præscutum with three dark brown stripes; abdomen dark brown with paler caudal margins to the segments; wings very pale brown, the radial sector very short, arcuated or angulated. (Northeastern United States.) ..... *cayuga* sp. n.

[16] Twenty-third Report of the New York State Entomologist, Pl. 25, fig. 3, 1907, as *Amalopis*.

Coloration reddish brown, the præscutum with three indistinct stripes; abdomen yellowish brown, the hypopygium bright yellow; wings nearly hyaline, the radial sector somewhat elongated, arcuated. (Northeastern United States.)..... *rubescens* sp. n.

The following general statements may be made regarding these species:

Rhaphidolabis (Rhaphidolabina) flaveola Osten Sacken. (Plate XXVIII, fig. 54.)

Canadian life-zone of the northeastern United States and eastern Canada, Osten Sacken's Maryland type being the most southern record. It is abundant from Ontario and Maine south to Maryland. In New York and New England it flies from May 30 to September 21, being most numerous in June. It may be looked for in cold, damp, shady places, such as along mountain streams and similar situations.

Rhaphidolabis (Plectromyia) modesta Osten Sacken. (Plate XXVIII, fig. 55.)

Canadian life-zone of the northeastern United States, known only from the White Mountains, New Hampshire, the type-locality, and the southern Adirondack Mountains, New York. It is found along small mountain streams, flying in June.

Rhaphidolabis (Rhaphidolabis) neomexicana Alexander.

Rocky Mountain region, known from two stations in Colorado and one in New Mexico.

Rhaphidolabis (Rhaphidolabis) polymeroides Alexander.

Known only from the type-locality, Eureka, Humboldt County, California, May 22, 1903 (H. S. Barber).

Rhaphidolabis (Rhaphidolabis) tenuipes Osten Sacken. (Plate XXVIII, fig. 56.)

Canadian and Canadian-Transitional life-zones of the eastern United States, from Maine to Georgia, flying in April and May in the south, a little later in the north, and reappearing in late summer.

Rhaphidolabis (Rhaphidolabis) cayuga sp. n. (Plate XXVIII, fig. 57.)

Canadian-Transitional zones of the northeastern United States. This is the earliest species of the genus in the north, appearing on the wing in April and early May, reappearing in August. In New York it comes with the very first of the early spring crane-flies, such as *Ormosia nubila*, *O. innocens*, *Limnophila brevifurca*, *Tipula collaris*, *T. dejecta*, etc.

Rhaphidolabis (Rhaphidolabis) rubescens sp. n. (Plate XXVIII, fig. 58.)

Canadian life-zone of the northeastern United States, appearing on the wing a little later than does the last (the first half of June). It is characteristic of cold Canadian woods near running water.

It is probable that, like the last-named species, it reappears in August as described under *R. tenuipes*, such species presumably being double-brooded.

Rhaphidolabis (Rhaphidolabis) cayuga sp. n.

Head brownish gray; thorax grayish brown with three dark brown stripes; abdomen dark brown, the segments narrowly ringed with paler; wings pale brown; cell R_2 sessile, *Rs* very short, arcuated or angulated; cell *1st* M_2 open by the atrophy of the median cross-vein; cell M_1 short.

Male.—Length, 5–5.4 mm.; wing, 6.3–6.6 mm.

Female.—Length, 6.6 mm.; wing, 7.7 mm.

Rostrum and palpi dark brown. Antennæ dark brown, the flagellar segments short-cylindrical. Head brownish gray.

Mesonotum grayish brown, the præscutum with three dark brown stripes, the middle stripe broadest, ending before the suture; lateral stripes narrow and less distinct; scutum light brown, the lobes largely dark brown; scutellum and postnotum dark with a heavy gray bloom. Pleura dark brown with a gray bloom. Halteres light yellow, the knobs dark brown. Legs with the coxæ and trochanters dark brown; femora similar, a little paler at the extreme base; tibiæ and tarsi dark brown. Wings with a light brown tinge, stigma a little darker but poorly defined, veins dark brown. Venation (Plate XXVIII, fig. 57): *Sc* long, Sc_2 far removed from its tip; distance between Sc_2 and the origin of *Rs* about twice the length of the sector; *Rs* very short, arcuated, angulated, or sometimes spurred; cell M_1 short and weak, tending to be evanescent, less than one-half the length of cell M_3.

Abdominal segments dark brown, the caudal margins of the terminal segments narrowly ringed with paler; hypopygium brownish yellow.

Habitat.—Northeastern United States.

Holotype, ♂, McLean, Tompkins County, New York, May 7. 1916 (Alexander).

Allotype, ♀, with the type.

Paratopotypes, 15 ♂ ♀; paratype, 1 ♂, near Johnstown, Fulton County, New York, August 19, 1916 (Alexander).

Type in the collection of the author.

This is the species figured by Needham under the name *tenuipes*,[17] the real *tenuipes* being shown in the same work, Plate 19, fig. 2.

[17] Twenty-third Report of the New York State Entomologist, Pl. 13, fig. 1 (1907).

The types occurred rather abundantly along a small woodland stream and were found commonly resting on the trunks of sugar maples, swarming out into the air at short intervals. The species occurred with the following crane-fly associates:

Ormosia innocens, O. nubila, O. rubella, Erioptera septemtrionis, Limnophila brevifurca, Adelphomyia minuta, Ula elegans, Pedicia conterminata and *Tipula dejecta.*

Rhaphidolabis (Rhaphidolabis) rubescens sp. n.

Head light silvery gray; mesonotum reddish, sparsely gray pruinose, with three indistinct brown stripes; abdomen yellowish brown, the hypopygium bright yellow; wings nearly hyaline; cell R_2 sessile; *Rs* arcuated, rather elongate; cell *1st* M_2 open by the atrophy of *m*; cell M_1 moderate.

Male.—Length, 5.3–5.5 mm.; wing, 6.3–6.6 mm.

Female.—Length 5.5–5.6 mm.; wing, 6.5–7 mm.

Rostrum and palpi dark brown. Antennæ with the basal segments brown, sparsely grayish pruinose; præscutum with three indistinct brown stripes, lateral stripes less evident, median stripe narrowed behind and becoming indistinct at the suture; scutum with the lobes brownish gray, the median area dull reddish yellow; scutellum pale brownish yellow, gray pruinose; postnotum light reddish with a gray bloom. Pleura light reddish with a sparse gray bloom. Halteres pale, the knobs brown. Legs with the coxæ and trochanters light brownish yellow; femora and tibiæ brownish yellow, the latter a little darkened towards their tips; tarsi brown. Wings nearly hyaline, stigma very pale to indistinct, veins dark brown. Venation (Plate XXVIII, fig. 58): *Sc* long, ending at nearly midlength of R_2; distance between Sc_2 and the origin of the sector about twice the length of the latter; *Rs* rather long, strongly arcuated, but not angulated; cell R_2 sessile, sometimes broadly sessile; cross-vein *r* at the tip of R_1; cell *1st* M_2 open by the atrophy of *m*; cell M_1 present, about one-half as deep as cell M_3.

Abdomen pale yellowish brown, the lateral margins more yellowish, the hypopygium bright yellow.

Habitat.—Northeastern United States.

Holotype, ♂, Simmons woods, Gloversville, Fulton County, New York, altitude 900 feet, June 22, 1916 (Alexander).

Allotype, ♀, topotypic, June 12, 1916.

Paratopotypes, 20 ♂ ♀, June 9, 1914; June 12 to 22, 1916.

Type in the collection of the author.

The ecological conditions under which this species lives have been

discussed in the second part of this series of papers[18] under the account of *Tipula cayuga* Alexander. A less detailed notice of the associates taken with the type will be found in the present paper under the account of *Limnophila edwardi*.

Family **PTYCHOPTERIDÆ.**

BITTACOMORPHA Westwood.

Bittacomorpha Westwood; London and Edinburgh Philosophical Magazine and Journal of Science, vol. 6, p. 281 (1835).

Subgenus BITTACOMORPHELLA subgen. n.

Agrees with *Bittacomorpha* s. s., but the apical cells of the wings with a sparse, strong pubescence, including the tip of cell *Sc*, all of *2nd* R_1, tips of R_3, R_4, R_5 and *2nd M*; in *B. sackeni* Röder, the pubescence is even more extensive, including the end of cell *C*, first R_1, all of cell R_4, almost the outer half of cells R_3 and R_5, and the ends of *2nd M* and Cu_1; metatarsi of the legs not swollen. A correlated character is the lack of a white ring near the base of the metatarsi.

Type of the subgenus, *Bittacomorpha jonesi* Johnson.

There are four species of this genus now known, two belonging to each subgenus, and their general distribution, seasonal and geographical, may be summarized as follows:

Bittacomorpha (Bittacomorpha) clavipes Fabricius.

The "Phantom Crane-fly" is one of our commonest and best-known species. It is a fly of the Canadian-Transitional to the Austral zones and has a wide range throughout America east of the Rockies, from Ontario, Quebec, New Brunswick, Nova Scotia and Newfoundland south to Florida, west to Manitoba and South Dakota. In New York and New England it is on the wing from May 17 to September 23, being common throughout the summer; in the southern part of its range it appears as early as February. The flies are abundant in low, wet swales, swamps, and along lakes and ponds. The curious rust-red lava with an extensile breathing tube is as remarkable as the adult fly.

Bittacomorpha (Bittacomorpha) occidentalis Aldrich.

Western United States, ranging from Washington to California, the latter records being for mid-May.

Bittacomorpha (Bittacomorphella) jonesi Johnson.

A fly of the Canadian life-zone of the northeastern United States,

[18] Proceedings of The Academy of Natural Sciences of Philadelphia, p. 486, September, 1915.

ranging from Maine, New Hampshire and Vermont south (in the mountains) to Mt. Toxoway, North Carolina, the type-locality. In New York and New England it flies from June 11 to August 31, being quite numerous in suitable localities throughout the latter half of June and all of July. It is found in cool, shady spots, usually near running water or springs, being very often found in small dark ravines or along shaded runs. They frequently lurk under dark culverts after the fashion of *Dolichopeza* and *Oropeza*.

Bittacomorpha (Bittacomorphella) sackenii Röder.

Northwestern United States and western Canada, ranging from Queen Charlotte Isle, British Columbia, south to California and east to Colorado. The records indicate that the insect is on the wing in June and early July.

The species of *Bittacomorpha* may be separated by the following key:

1. Wings with the apical cells without a strong pubescence; metatarsi swollen and white basally. (Subgen. *Bittacomorpha*.)..... 2
   Wings with the apical cells with a sparse strong pubescence; metatarsi not swollen, and without white near the base. (Subgen. *Bittacomorphella*.)..... 3
2. Dorsum of thorax deep velvety black with a white median line; cell R_4 of the wings one-third as long as R_5. (Eastern North America.)..... *clavipes* Fabricius.[19]
   Dorsum of thorax shiny black without a white median line; cell R_4 of the wings one-half as long as R_5. (Western United States.)..... *occidentalis* Aldrich.[20]
3. Tibiæ and metatarsi dark brownish black without white (except the extreme tip of the latter in some specimens), segments two and three of the tarsi pure white. (Western North America.)..... *sackenii* Röder.[21]
   Tibiæ black with a broad white band beyond the base; metatarsi with more or less white at the tip, broadest on the fore legs, narrowest on the hind legs; segments two and three of the tarsi pure white. (Northeastern United States.)..... *jonesi* Johnson.[22]

Explanation of Plates XXV to XXXI.

Plate XXV.—Fig. 1.—Wing of *Geranomyia canadensis* Westwood.
Fig. 2.—Wing of *G. distincta* Doane.
Fig. 3.—Wing of *G. intermedia* Walker.
Fig. 4.—Wing of *G. diversa* Osten Sacken.
Fig. 5.—Wing of *G. tibialis* Loew.

[19] *Tipula clavipes* Fabricius; Spec. Insect., vol. 2, p. 404 (1781).
[20] *Bittacomorpha occidentalis* Aldrich; Psyche, vol. 7, p. 201 (1895).
[21] *Bittacomorpha sackenii* Röder; Wien. Entom. Zeit., p. 230 (1890).
[22] *Bittacomorpha jonesi* Johnson; Psyche, vol. 12, pp. 75, 76 (1905).

Fig. 6.—Wing of *G. lachrymalis* Alexander.
Fig. 7.—Wing of *G. rostrata* Say.
Fig. 8.—Wing of *G. ibis* sp. n.
Fig. 9.—Wing of *G. insignis* Loew.
Fig. 10.—Wing of *Dicranoptycha germana* Osten Sacken.
Fig. 11.—Wing of *D. sobrina* Osten Sacken.
Fig. 12.—Wing of *D. winnemana* sp. n.
Fig. 13.—Wing of *Rhamphidia flavipes* Macquart.
Fig. 14.—Wing of *R. mainensis* sp. n.
Fig. 15.—Wing of *Teucholabis complexa* Osten Sacken.
Fig. 16.—Wing of *T. lucida* Alexander.

Plate XXVI.—Fig. 17.—Wing of *Gonomyia* (*Leiponeura*) *alexanderi* Johnson.
Fig. 18.—Wing of *G.* (*L.*) *cinerea* Doane.
Fig. 19.—Wing of *G.* (*L.*) *sacandaga* Alexander.
Fig. 20.—Wing of *G.* (*L.*) *pleuralis* Williston.
Fig. 21.—Wing of *G.* (*L.*) *puer* Alexander.
Fig. 22.—Wing of *G.* (*L.*) *manca* Osten Sacken.
Fig. 23.—Wing of *G.* (*Gonomyia*) *mathesoni* Alexander.
Fig. 24.—Wing of *G.* (*G.*) *blanda* Osten Sacken.
Fig. 25.—Wing of *G.* (*G.*) *californica* Alexander.
Fig. 26.—Wing of *G.* (*G.*) *sulphurella* Osten Sacken.
Fig. 27.—Wing of *G.* (*G.*) *flavibasis* Alexander.
Fig. 28.—Wing of *G.* (*G.*) *florens* Alexander.
Fig. 29.—Wing of *G.* (*G.*) *cognatella* Osten Sacken.
Fig. 30.—Wing of *G.* (*G.*) *noveboracensis* Alexander.
Fig. 31.—Wing of *G.* (*G.*) *filicauda* Alexander.
Fig. 32.—Wing of *G.* (*G.*) *virgata* Doane.
Fig. 33.—Wing of *G.* (*G.*) *subcincrea* Osten Sacken.

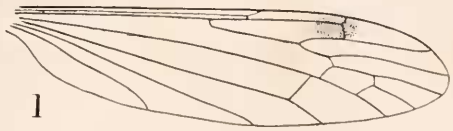
Plate XXVII.—Fig. 34.—Wing of *Erioptera* (*Erioptera*) *laticeps* sp. n.
Fig. 35.—Wing of *E.* (*Mesocyphona*) *tantilla* sp. n.
Fig. 36.—Wing of *E.* (*Empeda*) *nyctops* sp. n.
Fig. 37.—Wing of *Molophilus fultonensis* sp. n.
Fig. 38.—Wing of *M. nova-cæsariensis* sp. n.
Fig. 39.—Wing of *M. ursinus* Osten Sacken.
Fig. 40.—Wing of *Empedomorpha empedoides* Alexander ♂.
Fig. 41.—Wing of *Rhabdomastix* (*Sacandaga*) *monticola* sp. n.
Fig. 42.—Wing of *R.* (*S.*) *caudata* Lundbeck.
Fig. 43.—Wing of *R.* (*S.*) *flava* Alexander.
Fig. 44.—Wing of *Pterochionea bradleyi* sp. n.
Fig. 45.—Wing of *Limnophila edwardi* sp. n.
Fig. 46.—Wing of *L. sylvia* sp. n.

Plate XXVIII.—Fig. 47.—Wing of *Tricyphona inconstans* Osten Sacken.
Fig. 48.—Wing of *T. calcar* Osten Sacken.
Fig. 49.—Wing of *T. auripennis* Osten Sacken.
Fig. 50.—Wing of *T. hyperborea* Osten Sacken.
Fig. 51.—Wing of *T. katahdin* Alexander.
Fig. 52.—Wing of *T. vernalis* Osten Sacken.
Fig. 53.—Wing of *T. paludicola* sp. n.
Fig. 54.—Wing of *Rhaphidolabis* (*Rhaphidolabina*) *flaveola* Osten Sacken.
Fig. 55.—Wing of *R.* (*Plectromyia*) *modesta* Osten Sacken.
Fig. 56.—Wing of *R.* (*Rhaphidolabis*) *tenuipes* Osten Sacken.
Fig. 57.—Wing of *R.* (*R.*) *cayuga* sp. n.
Fig. 58.—Wing of *R.* (*R.*) *rubescens* sp. n.

Plate XXIX.—Fig. 59.—Hypopygium of *Gonomyia* (*Leiponeura*) *alexanderi;* dorsal aspect of the pleural appendages; *d* = dorsal appendage; *v* = ventral appendage.
Fig. 60.—Hypopygium of *G.* (*L.*) *helophila* Alexander; dorsal aspect of the pleural appendages; lettering as in Fig. 59.

Fig. 61.—Hypopygium of *G.* (*L.*) *alexanderi;* ventral aspect of the pleural appendages; lettering as in Fig. 59.
Fig. 62.—Hypopygium of *G.* (*L.*) *cinerea;* ventral aspect of the pleural appendages; lettering as in Fig. 59.
Fig. 63.—Hypopygium of *G.* (*L.*) *puer;* dorsal aspect of right pleurite; *p.gd.* = penis-guard.
Fig. 64.—Hypopygium of *G.* (*L.*) *manca;* dorsal aspect of right pleurite; lettering as in Fig. 63.
Fig. 65.—Hypopygium of *G.* (*L.*) *manca;* lateral aspect; lettering as in Fig. 63.
Fig. 66.—Hypopygium of *G.* (*Gonomyia*) *californica;* dorsal aspect of the right pleurite; lettering as in Figs. 59 and 63.
Fig. 67.—Hypopygium of *G.* (*G.*) *californica;* ventral aspect; lettering as in Figs. 59 and 63.
Fig. 68.—Hypopygium of *G.* (*G.*) *blanda;* dorsal aspect of the right pleurite; lettering as in Fig. 59.
Fig. 69.—Hypopygium of *G.* (*G.*) *blanda;* ventral aspect of the ventral appendage of the pleurite.
Fig. 70.—Hypopygium of *G.* (*G.*) *sulphurella;* dorsal aspect of the right pleurite.
Fig. 71.—Hypopygium of *G.* (*G.*) *florens;* dorsal aspect of the right pleurite; *k* = dorsal fleshy knob; *d* = first or dorsal appendage; *2* = second pleural appendage; *3* = third or ventral pleural appendage.
Fig. 72.—Hypopygium of *G.* (*G.*) *florens;* lateral aspect of the penis-guard.
Fig. 73.—Hypopygium of *G.* (*G.*) *cognatella;* lateral aspect of the penis-guard.
Fig. 74.—Hypopygium of *G.* (*G.*) *cognatella;* dorsal aspect of the right pleurite; lettering as in Fig. 71.
Fig. 75.—Hypopygium of *G.* (*G.*) *cognatella;* lateral aspect of the pleurite; lettering as in Fig. 71.

Plate XXX.—Fig. 76.—Hypopygium of *Gonomyia* (*Gonomyia*) *flavibasis;* dorso-lateral aspect.
Fig. 77.—Hypopygium of *G.* (*G.*) *flavibasis;* ventral aspect of the pleural appendages.
Fig. 78.—Hypopygium of *G.* (*G.*) *flavibasis;* apex of the ventral appendages.
Fig. 79.—Hypopygium of *G.* (*G.*) *noveboracensis;* pleural appendages, ventral aspect.
Fig. 80.—Hypopygium of *G.* (*G.*) *noveboracensis;* ventral aspect of the left side of the penis-guard and the gonapophyses; *a*, *b*, *c* = horns of the fused cylinder.
Fig. 81.—Hypopygium of *G.* (*G.*) *filicauda;* dorsal aspect of the right pleurite; *d* = dorsal pleural appendage; *v* = ventral pleural appendage.
Fig. 82.—Hypopygium of *G.* (*G.*) *filicauda;* lateral aspect of the penis-guard.
Fig. 83.—Hypopygium of *G.* (*G.*) *subcinerea;* dorsal aspect of the right pleurite; lettering as in Fig. 81.
Fig. 84.—Hypopygium of *G.* (*G.*) *subcinerea;* ventral aspect of the left side of the penis-guard.
Fig. 85.—Hypopygium of *G.* (*G.*) *subcinerea;* dorsal pleural appendage.
Fig. 86.—Hypopygium of *G.* (*G.*) *æqualis* Alexander; dorsal aspect of the right pleurite; lettering as in Fig. 81; *a.t.* = anal tube.
Fig. 87.—Hypopygium of *G.* (*G.*) *virgata;* dorsal aspect of the right pleurite; lettering as in Fig. 81; *2* = second pleural appendage.
Fig. 88.—Hypopygium of *G.* (*G.*) *unicolor* Alexander; ventral aspect of the penis-guard and the gonapophyses; *p.gd.* = penis-guard; *a* = subtending arm; *g* = gonapophyse.
Fig. 89.—Hypopygium of *G.* (*G.*) *unicolor;* dorsal aspect of the right pleurite; lettering as in Fig. 81.
Fig. 90.—Hypopygium of *G.* (*G.*) *mexicana* Alexander; ventral aspect of the penis-guard; lettering as in Fig. 88.
Fig. 91.—Hypopygium of *G.* (*G.*) *mexicana;* dorsal aspect of the right pleurite; lettering as in Figs. 81 and 87.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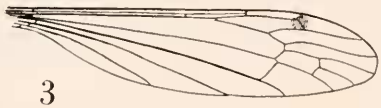
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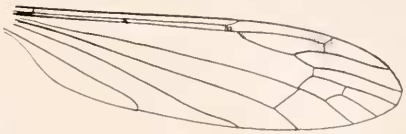
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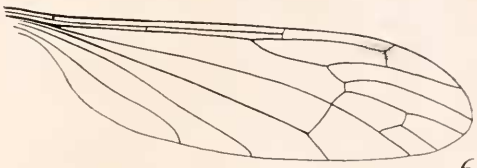
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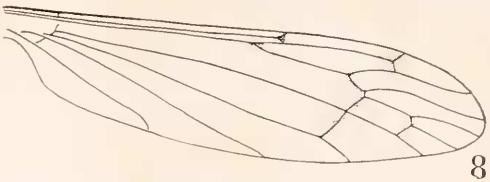
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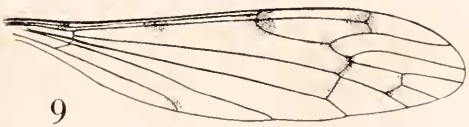
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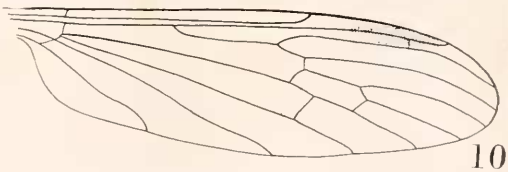
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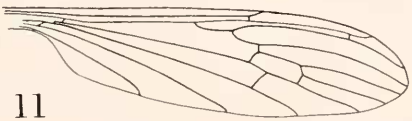
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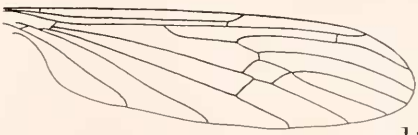
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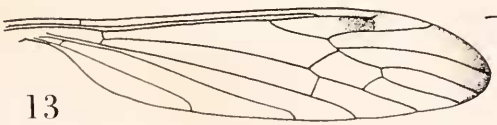
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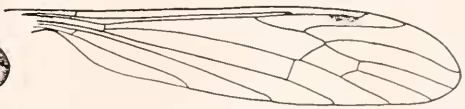
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